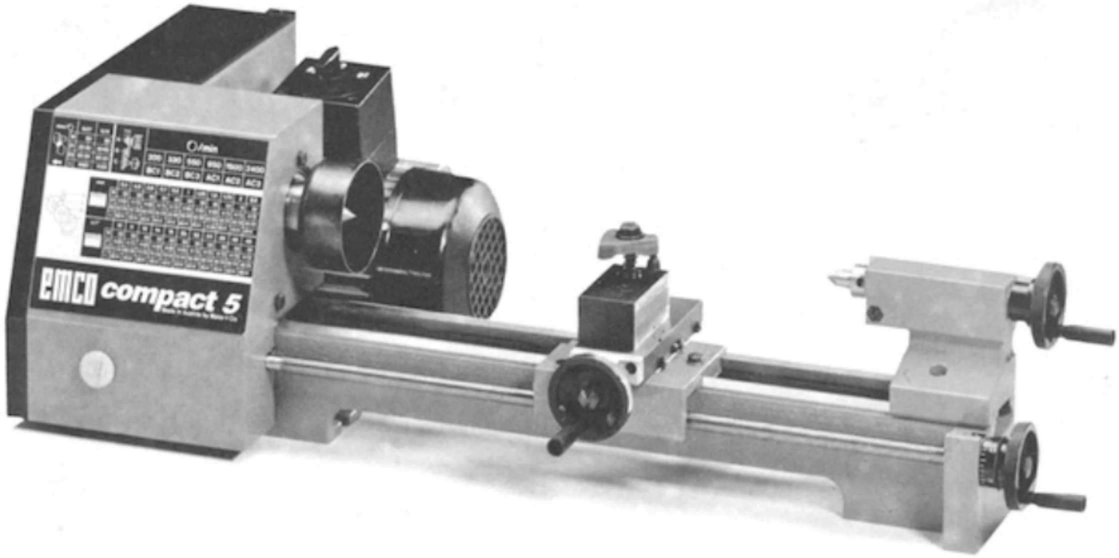
Instruction book

Service parts

EMCO compact 5



Englisch Order No. EN 2 001

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Maier + Co.
A-5400 Hallein/Austria

Forword

This Instruction Manual contains a general description of the machine and its operating elements, mounting instructions for the accessories, working tips and rules for accident prevention.
The chapters "Basics about Turning, Drilling and Milling" and the numerous working tips actually exceed the usual contents of an Instruction Manual. We feel, however, that these chapters convey the necessary basic information to the aspiring professional and draw the professional's attention to special features and the universality of the machine.
The working tips are indicated with the mosaic screen pattern.
The sizes of screws, nuts, bolts, etc. are not always indicated in the mounting instructions. These dimensions can be found in the Service Parts List.
Always follow the rules for accident prevention!
The construction of the Compact 5 and the accessories meets all current safety regulations in industry and schools, but improper or careless working methods can lead to injuries.
Read the Instruction Manual carefully before starting the machine - a few minutes now can save valuable time and frustration later. Only proper operation can guarantee the desired results.

Index – Turning

Accident Prevention	3
Technical Data	4
Basic Equipment, Care of machine	5
Accessories lathe (summary)	6
Basic terms about Turning	7/8
Turning tools	9/1o
Setting up the machine, electrical Connection	11
Main Components	12-16
Splashguard	16
Turning between centers	17
Clamping devices for Workpieces (summary)	18
3-jaw chuck	19-22
Clamping plate	22
Independent chuck	23
Collet chuck attachment	24
2-way toolholder, Quick-change toolholder	25
Travelling steady, Steady rest	26/28
Automatic feed mechanism	28
Mounting the gears	29/3o
Thread pitches, gear combinations	3o/31
Adjustments	32
Lubrication	33
Troubleshooting chart	34
Drilling and Milling	35-54
Wiring diagram	55
Spare parts list follows!	

Accident Prevention: Milling – Drilling

- FOLLOW ALL ACCIDENT PREVENTION RULES! Read instruction manual before working with the machine.

- ELECTRICAL CONNECTION: The electrical connections must be carried out professionally. A grounding receptacle must be available. Mounting of the plug (if not already mounted) must also be carried out professionally.

- DO NOT ALTER GUARDS! When turning between centers, mount lathe dog guard. Close belt guard before starting machine. Never open belt guard while machine is running.

- KEEP CHILDREN AND VISITORS AWAY! The machine should be stored so that children and visitors not acquainted with the use of the machine cannot start it.

- ALWAYS WEAR SAFETY GOGGLES! Be also aware that some materials (for examp. brass) spray while being worked on. Therefore, it is important that all persons near the machine are protected.

- WEAR PROPER APPAREL! Loose sleeves could get caught in chuck or workpiece.

- KEEP WORK AREA CLEAN! Cluttered areas and benches invite accidents.

- REMOVE ADJUSTING KEYS AND WRENCHES; even when machine is not being used. The chuck keys should never be attached to the machine with chains or similar.

- USE CHIP HOOK for removing chips!

- NEVER TOUCH RUNNING MACHINE PARTS! Never try to stop workpiece or chuck with the hand.

- DO NOT SURPASS THE CLAMPING CAPACITY OF THE LATHE CHUCK! The maximum clamping capacities are indicated on page 11 and 14.

- BE CAREFUL OF EXTENDING CHUCKS! Never reach over running (rotating) chucks.

- SWITCH MACHINE OFF BEFORE SERVICING! Remove plug from socket.

- TURN OFF MOTOR BEFORE ATTEMPTING adjustments, maintenance or measuring work.

- USE ORIGINAL SPARE PARTS!

Technical Data

Center height	65 mm
Distance between centers	35o mm
Swing over bed	13o mm
Swing over cross slide	8o mm
Travel of cross slide	5o mm
Travel of top slide	45 mm
Leadscrew diameter	12 mm
Leadscrew pitch	1,5 mm
Approx. net weight	2o kg

HEADSTOCK:

Spindle nose	Factory standard
Spindle bore	16 mm
Spindle inside taper	MT 2
Number of spindle speeds	6
Range of speeds (5o cyc.)	2oo-24oo rpm

MOTOR (22o V, single-phase):

Input power (P1)	5oo W, S3-6o%
Output power (P2) at 28oo rpm	3oo W, S3-6o%

TAILSTOCK:

Center sleeve diameter	22 mm
Inside taper	MT 1
Stroke of center sleeve	35 mm

FEEDS (with accessory automatic feed mechanism)

2 longitudinal feeds: o,o7 mm/rev,
o,14 mm/rev

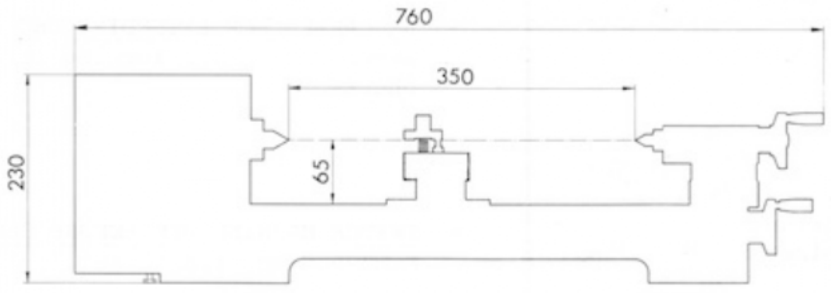
THREADS (with accessory automatic feed mechanism)

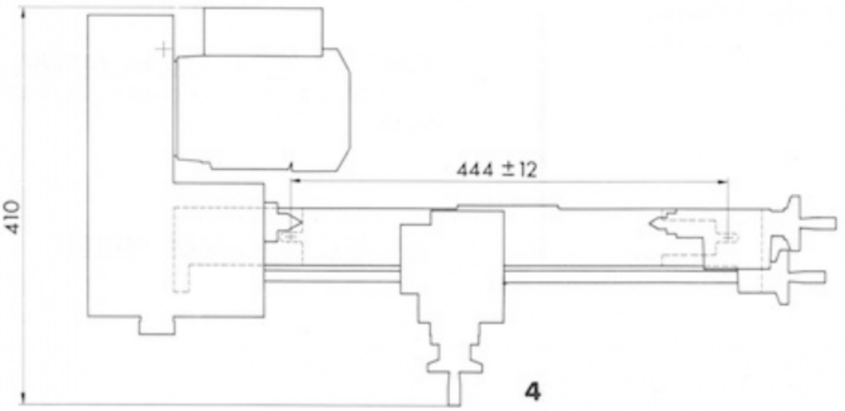
5 metric threads: o,4/o,6/1,o/1,25/
1,5 mm

With Set of Change Gears:

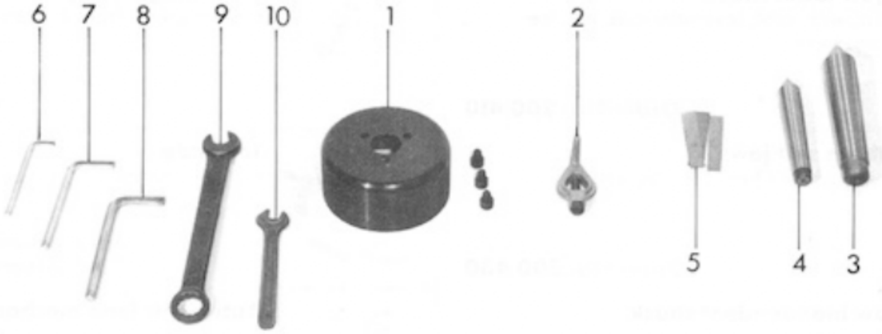
Additional 1o metric threads: o,25/o,3/o,35/o,5/o,7/o,75/o,8/1,75/2,o/2,5 mm

and 14 inch threads: 48/4o/36/32/28/24/22/2o/18/16/14/12/11/1o tpi





Basic Equipment



Lathe bed, headstock, tailstock, longitudinal and cross slide with single toolholder and clamping shoe, motor with belts and pulleys, instruction book, spare parts list.

BASIC EQUIPMENT		SERVICE TOOLS	
1	Safety driving plate	6	Hexagon key 3 mm
2	Lathe dog	7	Hexagon key 4 mm
3	MT 1 center	8	Hexagon key 5 mm
4	MT 2 center	9	Key 1o/13 mm
5	Tool spacers	10	Single-ended spanner 8 mm

Unpacking, Cleaning the Machine

Check the machine for possible transport damages and for completeness of the delivered parts. - See "Basic Machine".

The blank surfaces of the machine are coated with a rust-protective. Remove this substance carefully with petrol and oil machined surfaces with light machine oil.

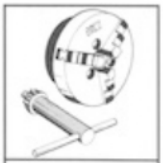
Care of Machine

The Compact 5 is a precision machine tool. Exact care of the machine is a pre-requisite for the long-lasting precision and efficiency.

Have a look to the professionals operating their machines and how they care about it - and you will do it all right.

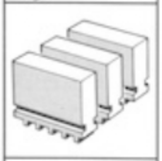
- Clean and oil all machine surfaces regulary!! (light machine oil) For cleaning use a brush or a cloth. Chips and dirt on the leadscrew cause quick wear of the leadscrew nut.
- Clean the spindle nose and threads before mounting the chuck or independent chuck.
- Never use force!

Accessories Lathe



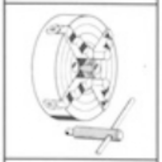
Three-jaw lathe chuck
80 mm dia., with scroll, reversible jaws, and tee-handle pinion key

Order No. 200 410



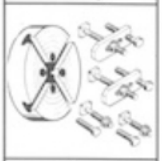
Set of three soft jaws
for three-jaw chuck Order No. 200 410

Order No. 200 430



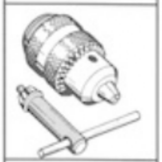
Four-jaw independent chuck
90 mm dia., with reversible jaws

Order No. 200 420



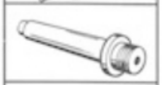
Clamping plate
90 mm dia., with 4 chucking grooves, 2 clamps.
Technical tip: Fits on spindle of headstock and on divider Order No. 200 320 and support flange Order No. 200 250

Order No. 200 360

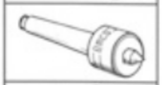


Three-jaw drill chuck
capacity 1–8 mm, with M 14x1 mounting thread

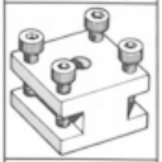
Order No. 152 500



Morse taper arbor MT 1
with M 14x1 mounting thread (for mounting drill chuck to tailstock)
Order No. 200 280

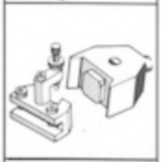


Revolving center MT 1
Order No. 200 270

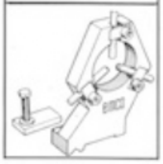


Double tool holder
for square tools up to a maximum cross-section of 6x6 mm.
Technical tip: Fits on top slide Order No. 200 500

Order No. 200 010

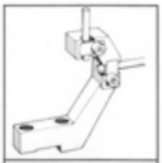


Quick-change tool holder
consisting of tool holder body, 3 standard tool holders, 1 operating key. For square tools up to a maximum cross section of 8x8 mm.
Technical tip: Fits on top slide Order No. 200 500 (200 550)
Order No. 202 000



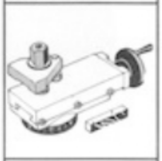
Fixed steady
for workpieces from 2–40 mm dia.

Order No. 200 240



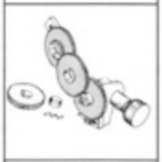
Travelling steady
for workpieces from 4–25 mm dia.

Order No. 200 230

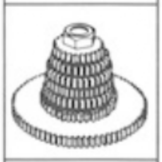


Top slide
for taper turning

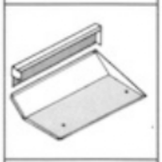
metric version **Order No. 200 500**
inch version **Order No. 200 550**



Automatic feed mechanism
consisting of gear quadrant with six change gear-wheels and clutch for two longitudinal feeds and five thread pitches (four thread pitches on inch type machine)
Order No. 200 300

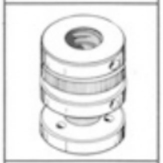


Set of change gears
consisting of seven change gears for thread cutting, 10 metric pitches from 0.25–2.5 mm and 14 inch pitches from 48 to 10 tpi (11 metric pitches from 0.25 to 1.75 mm and 13 inch pitches from 64 to 10 tpi on inch type machine)
Order No. 200 200



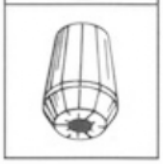
◄ Splash guard with chip tray
can also be mounted at later stage
Order No. 200 150

Safety goggles
Order No. 152 120



Collet attachment
consisting of collet holder and union nut. For collets type ESX-25, capacity 1.5–14 mm

Order No. 200 040



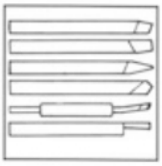
Set of 14 collets ESX-25
in wooden case, gripping capacity 1.5–14 mm

Order No. 225 000

Individual collets ESX-25

Nominal diameter in mm	Chucking capacity in mm	Chucking capacity in inches	Order No.
2,0	1,5–2,0	1/16–5/64	**225 020**
2,5	2,0–2,5	3/32	**225 025**
3,0	2,5–3,0	7/64	**225 030**
4,0	3,0–4,0	1/8–9/64–5/32	**225 040**
5,0	4,0–5,0	11/64–3/16	**225 050**
6,0	5,0–6,0	13/64–7/32–15/64	**225 060**
7,0	6,0–7,0	1/4–17/64	**225 070**
8,0	7,0–8,0	9/32–19/64–5/16	**225 080**
9,0	8,0–9,0	21/64–11/32	**225 090**
10,0	9,0–10,0	23/64–3/8–25/64	**225 100**
11,0	10,0–11,0	13/32–27/64	**225 110**
12,0	11,0–12,0	7/16–29/64–15/32	**225 120**
13,0	12,0–13,0	31/64–1/2	**225 130**
14,0	13,0–14,0	33/64–17/32–35/64	**225 140**

Tools Lathe

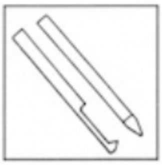


6 turning tools
assorted, ground

Order No. 111 500

5 turning tools
unground

Order No. 110 010



2 threading tools
external and internal

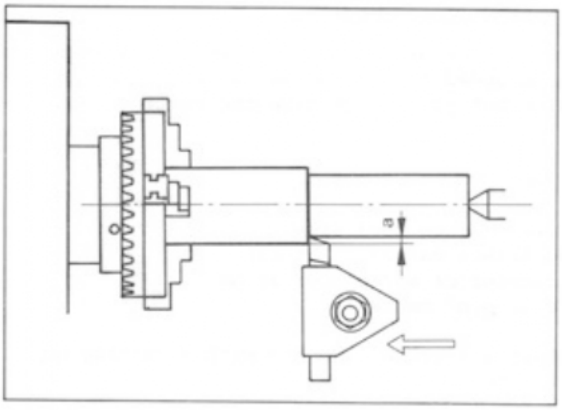
Order No. 111 600

Some Basic Terms About Turning

Longitudinal Turning

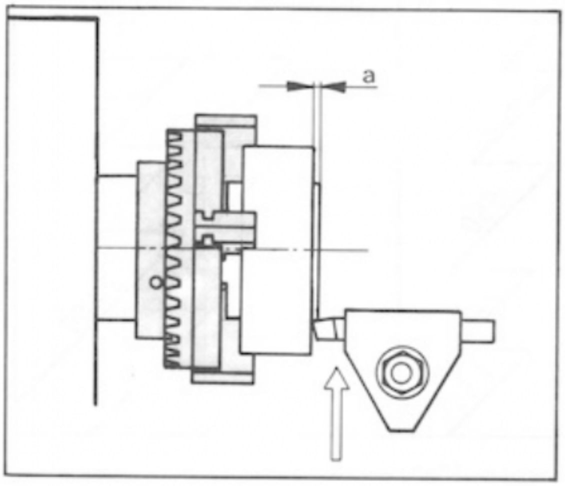
The turning tool is moved parallel to the axis of rotating workpiece and removes material (feed direction of the tool is parallel to the axis).
"a" is the depth of cut.

If the feed is carried out from left to right (in the direction of the headstock), then a righthand tool must be used.



Facing

The tool is moved at a right angle to the axis of rotation (feed direction: at a right angle to the axis). - The illustration shows a left turning tool.
"a" is the cutting depth.



Taper Turning

The top slide is clamped at an angle in relation to the axis of rotation. Feed direction is in this adjusted angle.

The Feed (s)

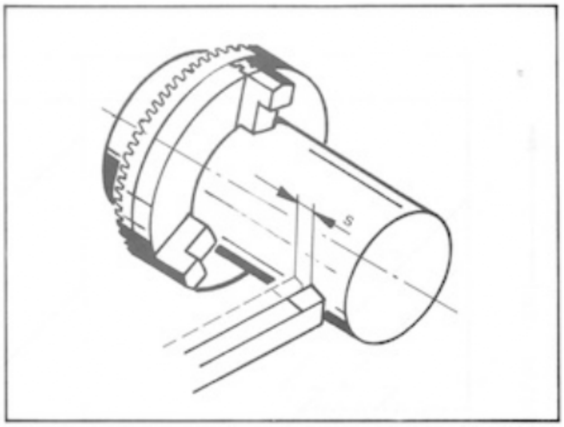
The size of feed (s) is the path of the turning tool during one revolution of the workpiece.

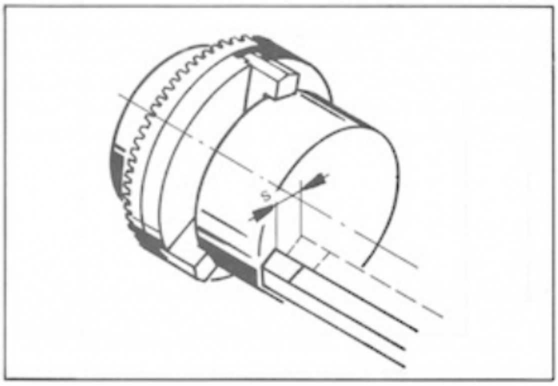
SIZE OF FEED IS CALLED FEED FOR SHORT

Large feed: ——► Rough surface

Small feed: ——► Smooth surface

Feeding is done by turning the respective handwheels. With the accessory "automatic feed mechanism" you can turn with automatic feeding in longitudinal directions with two feed sizes (o,o7 and o,14 mm/rev). - Adjustment see pages 16,17,18.





Spindle Speeds

On the Compact 5 six spindle speeds can be set: 2oo/33o/55o/95o/15oo/24oo revolutions per minute.- Adjusting the speeds see page 7.

Why different main spindle speeds?

1. Torque:

   When turning large diameters or hard materials you need a higher torque than for small diameters or soft materials.
   As the motor power is constant, you achieve the different torques by changing the spindle speeds. Low spindle speeds mean higher torque.

2. Heating of the turning tool:

- The higher the spindle speed (with equal diameters of the workpiece),
- the harder the workpiece,
- the larger the depth of cut (a),
- the larger the feed (s),

the more the temperature of the tool will increase. - High speed tool steel (HSS) looses sharpness at a temperature of approx. 6oo° C.

As the workpiece diameter is assumed as existing, you have to regulate the spindle speed, the depth of cut, the feed as not to overheat and damage the cutting tool.

Cutting Speed Chart

The Speed Chart

The chart shows the recommended speeds considering the parameters

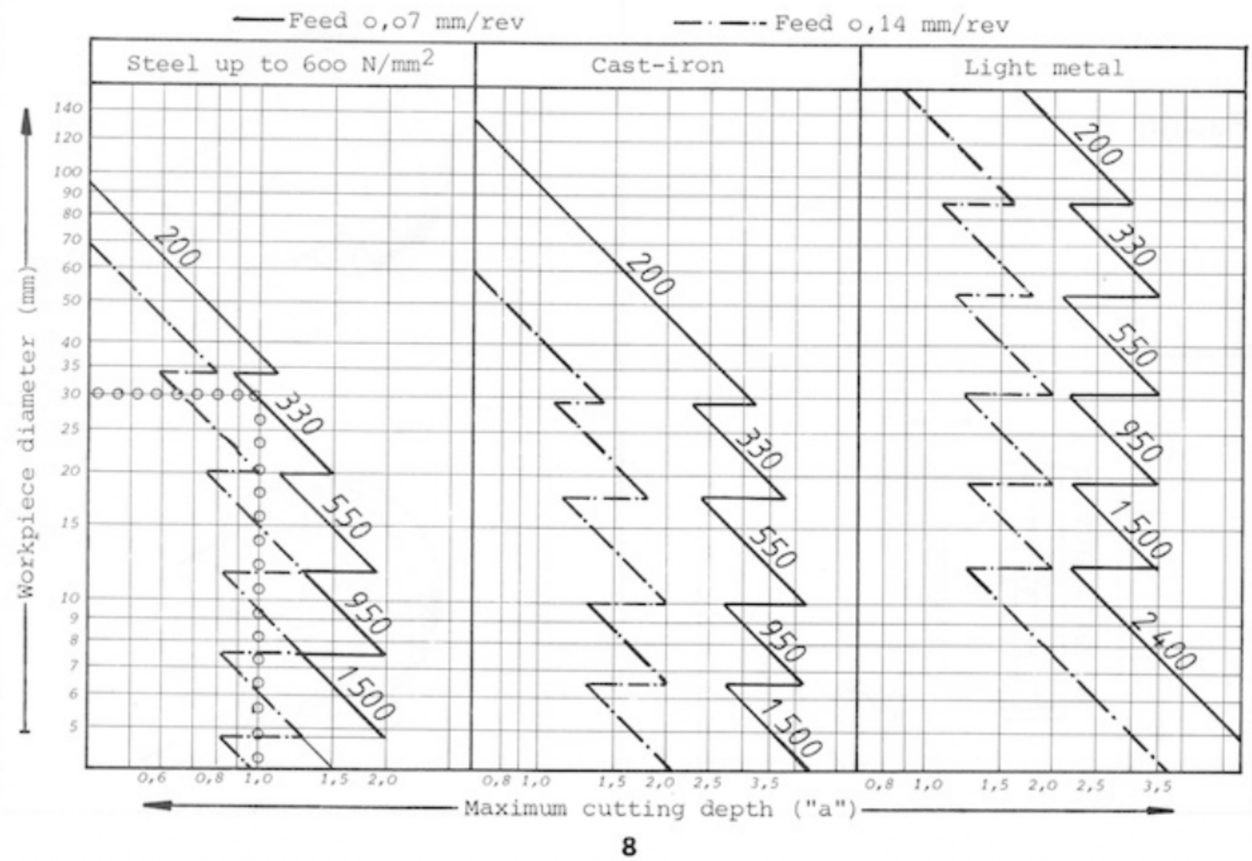
- diameter of workpiece
- material of workpiece
- depth of cut "a" and
- feed "s"

The values are valid for carbon tool steel. Using high speed tools you can increase the speed one step but you must reduce the cutting depth then.

Example:

Tool: Carbon tool steel
Workpiece material: Steel
Diameter of workpiece: 3o mm
Feed: o,o7 mm/rev

shows a speed of 33o rpm with a cutting depth (a) of 1 mm.



The Turning Tools

With the Compact 5, various turning work, such as longitudinal turning, facing, grooving, parting-off, internal turning, form turning and thread-cutting can be done.

For each type of work, the corresponding turning tool is required. - The arrows on the illustrations indicate the possible feed directions.

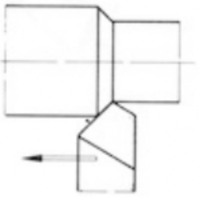
Longitudinal feed ⇄

Cross feed ↑↓
(transverse)

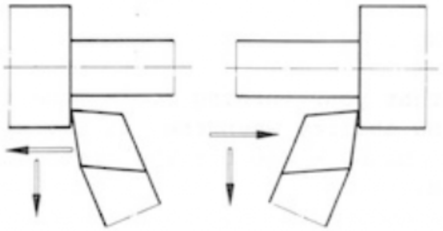
Note the different clamping angles of the turning tools (see illustration).

Set of 6 Turning Tools

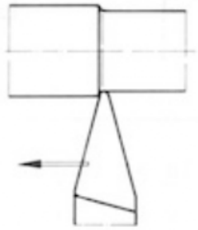
Roughing Tool is used for removing a large amount of material in a short time.



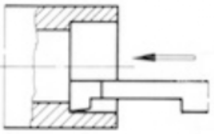
Side Tools they are used for longitudinal and transverse turning and for turning acute corners.



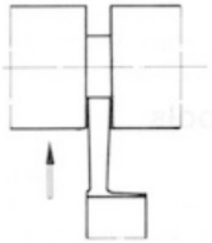
Planing Tool for a smooth surface
The depth of cut (a) may not be too big.



Boring Tool

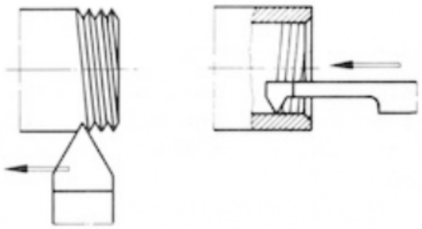


Parting-Off Tool it is used for grooving and parting-off.
When parting-off, you must note: exact center height of tool bit point, low spindle speed, lubrication.

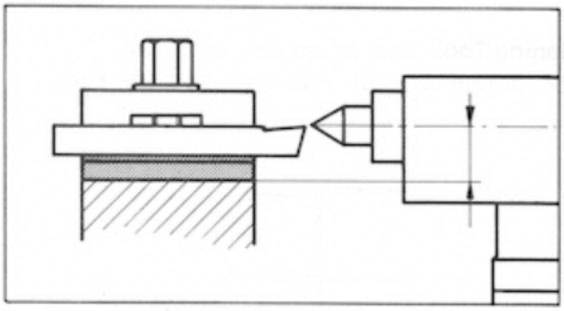


Thread-Cutting Tools

External and internal thread-cutting tool, angle 6o°

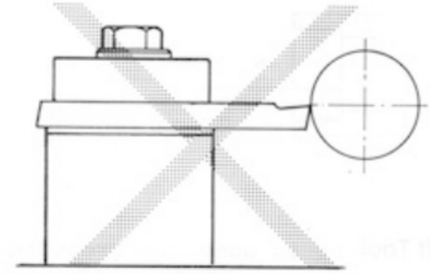


Correct Mounting of Tools



1. Mounting tools at center height:

The turning tools must be clamped so that the main cutting edge is exactly at center height. For this purpose, spacers of steel are used.



2. Overhang:

Clamp the turning tool with as little overhang as possible; a tool with too much overhang bends and causes rattling and an uneven workpiece surface.

Sharpening Tools

After longer use or when turning with too high cutting speed, the cutting edge of the turning tool is worn-off. Worn-off turning tools cause rough and uneven surfaces, as well as unnecessary wear and overload of the machine. - For this reason the worn-off turning tools should be sharpened immediately.

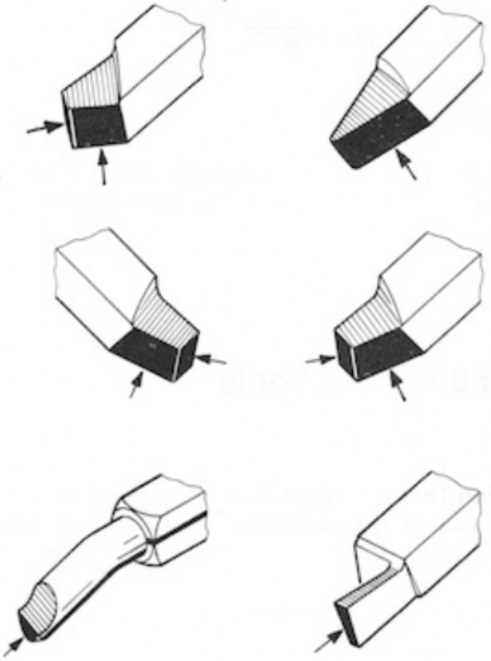
Sharpening with oilstone:

Sharpen only the blackened surfaces of the tools, in no case the ribbed ones. Note that the angles of the surfaces are not changed.

Grinding Tools

Strongly worn-off turning tools must be ground. Grinding requires some practice and feeling.

- Grind only blackened surfaces
- Note that the angles of the surfaces are not altered.



Care of Tools

The tools must be stored so that the cutting edges are not damaged.

WORKING TIP:

Note that your turning tools lose their cutting ability when the cutting speed is too high. - See cutting speed chart, page B.

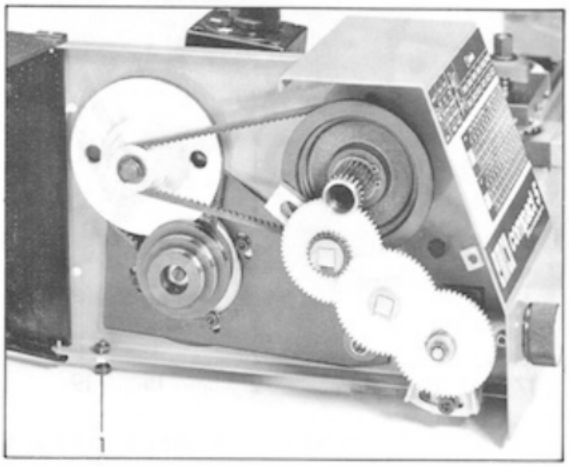
Setting-Up the Machine

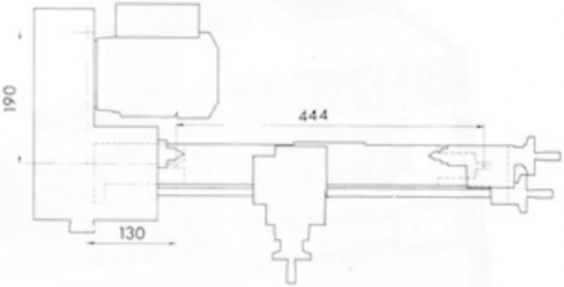
Mount the machine on an appropriately stabile and absolute uneven workbench, fastening with screws, or if the working area should be varible, on an even wooden board resp. plywood board (3-4 cm thick).

If the machine is not fastened with screws, vibrations could occur, which would encourage a negative turning result.

The sketch indicates the distance between holes for bolting down the machine and the distance of the support screw.
Recommended size of screws: 6-8 mm dia.

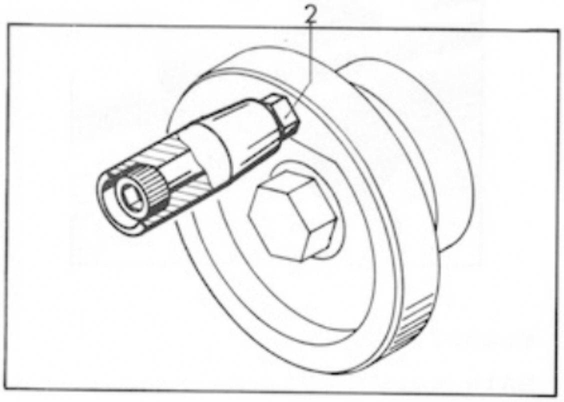
Support the carrier plate with the hexagon screw (1). The hexagon nut serves for tightening the screw.





MOUNTING THE HANDLE ON THE LONGITUDINAL SLIDE HANDWHEEL AND CROSS SLIDE HANDWHEEL

Mount handle with allen screw and tighten hexagon nut (2) so that the handle turns freely and does not have too much axial play.



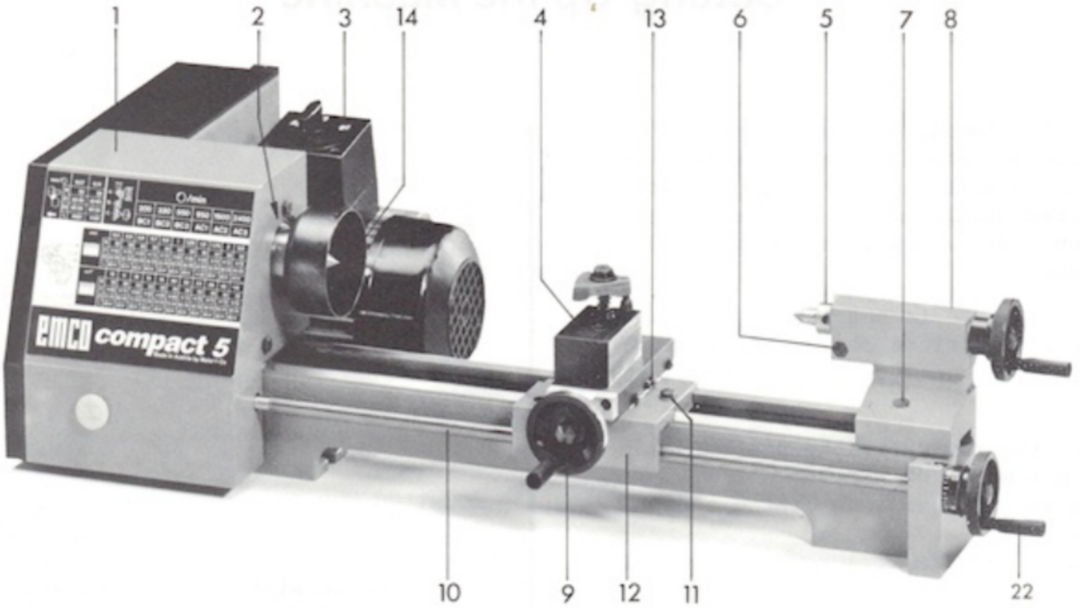
Electrical Connection

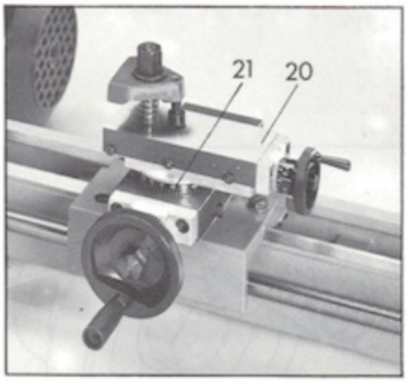
A grounding receptacle must be available for connection of the machine!

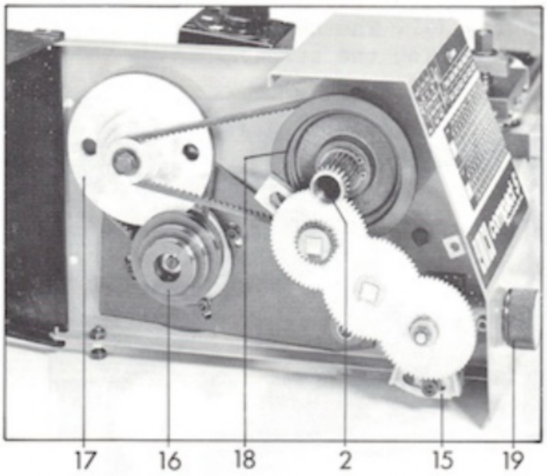
Mounting the Plug

Clamp the grounding wire (yellow-green) to the grounding contact (symbol ⏚). Clamp the other two wires to contact R and N.

Main Components







1	HEADSTOCK
2	MAIN SPINDLE
3	MOTOR SWITCH
4	TOOLHOLDER WITH CLAMPING SHOE
5	TAILSTOCK SLEEVE
6	CLAMPING SCREW FOR TAILSTOCK SLEEVE
7	CLAMPING SCREW FOR TAILSTOCK
8	TAILSTOCK
9	CROSS SLIDE HANDWHEEL
1o	LEADSCREW
11	CLAMPING SCREW FOR LONG. SLIDE
12	LONGITUDINAL SLIDE
13	CLAMPING SCREW FOR CROSS SLIDE
14	LATHE DOG GUARD
15	CHANGE GEARS (Accessory)
16	MOTOR PULLEY (A)
17	IDLER PULLEY (B)
18	MAIN SPINDLE PULLEY (C)
19	SWITCH FOR AUTOMATIC FEED MECHANISM (Accessory)
2o	TOP SLIDE WITH CLAMPING SHOE (Accessory)
21	SCALE ON TOP SLIDE
22	LONG. SLIDE HANDWHEEL

Design, Controls, Operating Elements

Lathe Bed

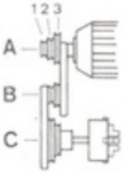
The lathe bed is made of high-quality cast-iron. The strong side walls and ribbing assure high rigidity and torsion resistance. Cast-iron absorbs vibrations exceptionally well.
The high precision ground guideways guarantee lasting and exact slide and tailstock running guidance.

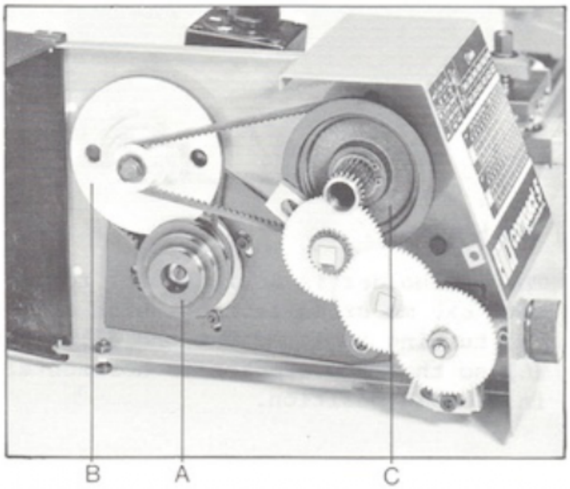
The Main Spindle Drive

The motor is reversible (this is necessary for thread-cutting). The main spindle is driven either directly from the

- + Motor pulley A to the main spindle pulley C (speeds 95o/15oo/24oo rpm) or from the
- + motor pulley A to the idler pulley B and from the idler pulley B to the main spindle pulley C (speeds 2oo/33o/55o rpm).

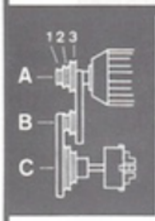
The belt from the motor pulley to the idler pulley is never changed.





Spindle Speed Chart

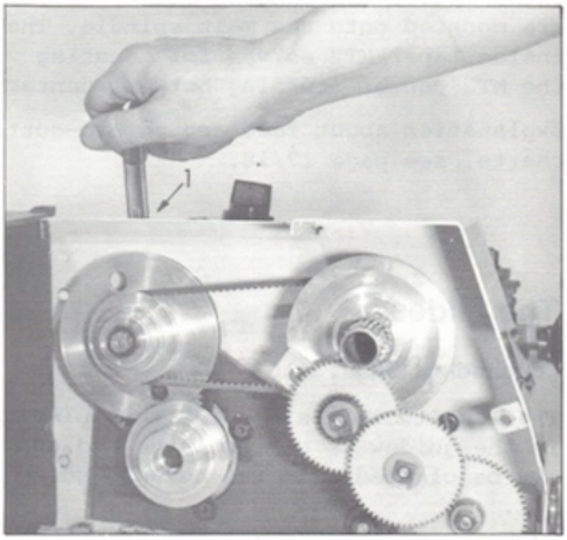
The spindle speeds and the corresponding belt positions are indicated on the front plate of the spindlestock.

	⟳/min					
	200	330	550	950	1500	2400
	BC1	BC2	BC3	AC1	AC2	AC3

Setting the required spindle speed:

Loosen the hexagon screw (1) and lift the motor upwards. Place the belt on the required pulley combination. Press the motor downwards - this tightens the belt - and tighten the hexagon screw.

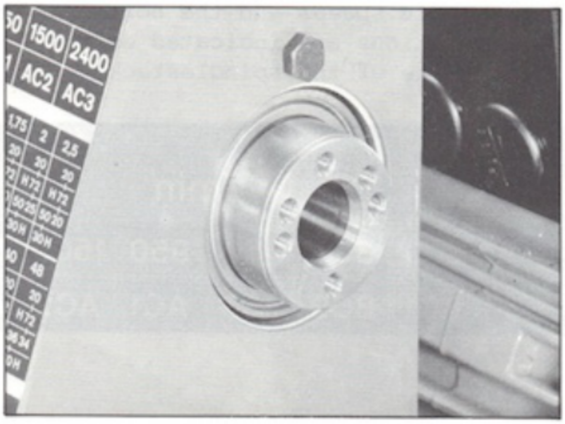
The illustration below shows belt position BC3 (55o rpm).



TIP

If the belt should slide when using low spindle speeds, the belt must be tightened or the cutting depth must be reduced.

Head Stock, Main Spindle



The main spindle is supported by 2 ball bearings in the sturdy headstock housing. The ball bearings are completely enclosed and lubricated for life (no lubrication). The bearings are preloaded by a special spring so the main spindle runs always playfree (no adjustment is to be done).

Lathe chuck, independent chuck, etc. are mounted onto the main spindle. The inside taper MT2 serves for mounting the MT2 center (turning between centers).

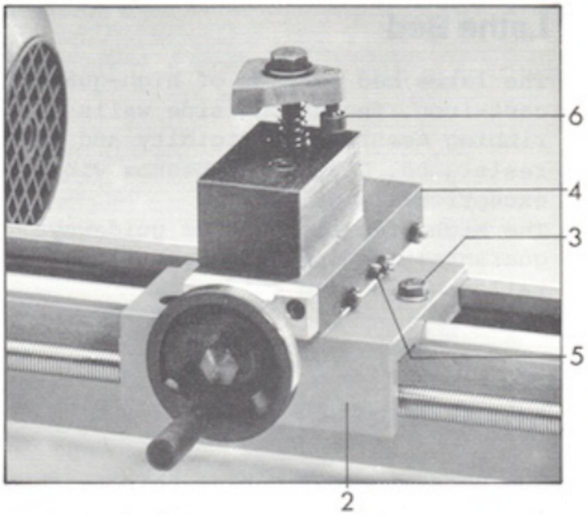
Explanation about feed and thread-cutting charts, see page 17/18.

The Slides

Longitudinal Slide

The longitudinal slide (2) runs playfree in the guideways of the lathe bed and can be clamped with the hexagon screw (3).

Longitudinal adjustment (manual feed) is achieved via handwheel to the leadscrew. The scale divisions on the handwheel: o,o5 mm. When a complete turn of the handwheel is made, the longitudinal slide moves 1,5 mm.



Cross Slide

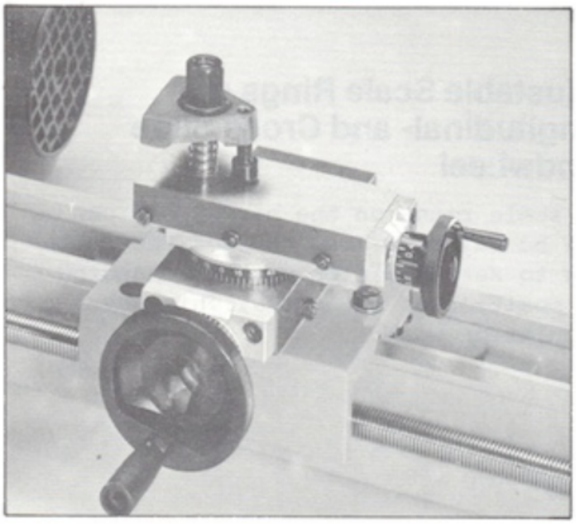
The cross slide (4) runs playfree in the adjustable dovetail guideway of the longitudinal slide. The cross slide can only be adjusted by hand (manually). The scale divisions relate to the diameter and are indicated by o,o5 mm.
This means: when the cross slide is adjusted 1 mm according to the scale ring, 1 mm of the diameter of the workpiece will be turned off. The actual movement of the cross slide is, however, o,5 mm.

The cross slide can be clamped with the set screw (5).

Tool Holder

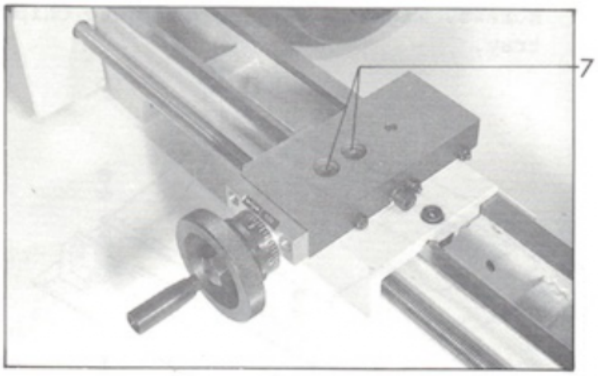
The toolholder is designed for tools with 6x6 mm cross-section. When clamping the turning tool, adjust the allen screw (6) so that the bracket is horizontal in clamped position.

Top Slide (Accessory)

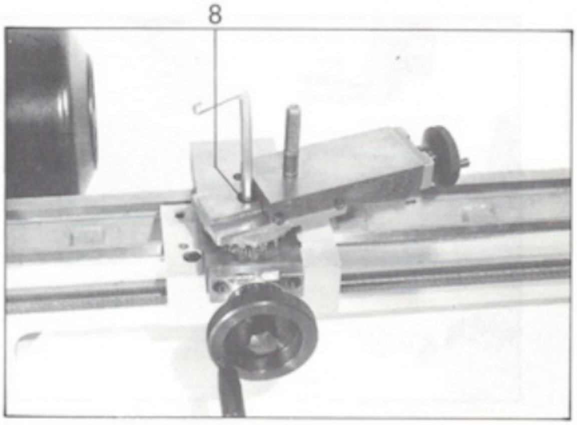


The top slide runs playfree in a dovetail guideway and can be clamped in any required angle relating to the turning axis. The graduated scale enables exact angle adjustment. With the clamping shoe, tools with a maximum size of 12x12 mm cross-section can be clamped. - Scale divisions on handwheel: o,o5 mm

Mounting the Top Slide:

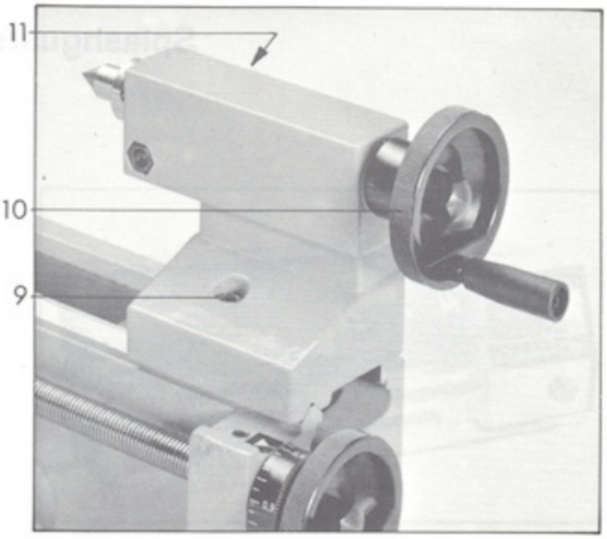


Depending on the required working position, set the top slide in the front or rear centering bore (7) and clamp in the required angle with the allen screw (8).



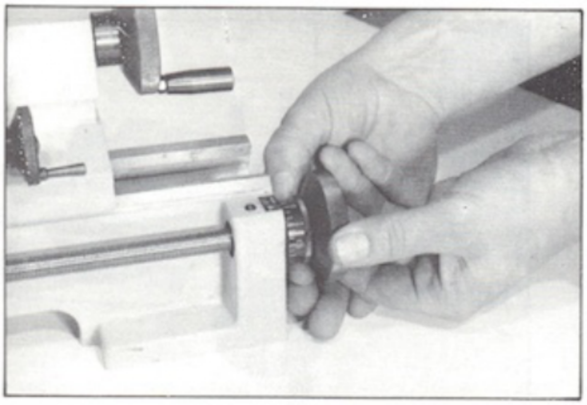
Tailstock

The tailstock serves for holding long workpieces. For this purpose, the fixed center or the revolving center is placed into the inside taper of the tailstock sleeve. After loosening the clamping screw (9), the tailstock can be moved on the lathe bed. The tailstock sleeve can be adjusted by turning the handwheel (1o) and is fixed before turning work with the clamping screw (11).



If you turn back the sleeve all the way, the center is automatically ejected.

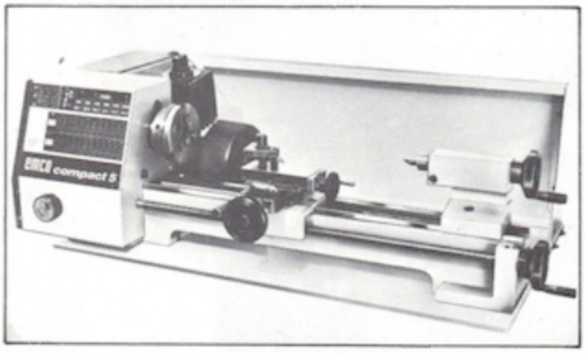
For drilling, the drill chuck is placed into the sleeve. The drill feed is effected with the handwheel. The drilling depth can be seen on the scale on the sleeve.



Adjustable Scale Rings on Longitudinal- and Cross Slide Handwheel

The scale rings on the handwheels can also be adjusted. You can set the scale ring to zero position without changing the position of the slide. This saves calculation work.

Splashguard with Chip Tray

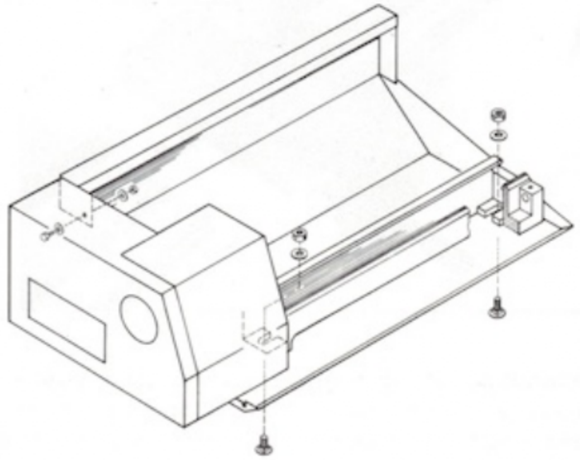


Splashguard with Chip Tray

The working area is kept clean by the chip tray and splashguard. With the splashguard it is not necessary to bolt the machine to a workbench. The 4 plastic washers on the bottom of the chip tray are shock absorbing. The unit can be placed on every stabile table.

Mounting

1. Assemble the chip tray and splashguard with screws (dimensions see spare parts list).
2. Set up machine, bolt splashguard with carrier plate of the machine with screws. Tighten machine bed onto chip tray.



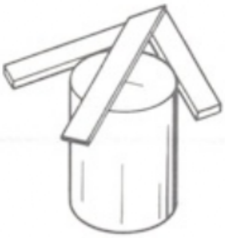
Turning between Centers

In order to clamp the workpiece, a center bore must be made at each face end.

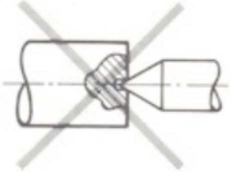
Making a Center Bore

- If the workpiece is not too long, you can mount it in the lathe chuck and align it so that the free end runs centrically. Insert drill chuck into tailstock sleeve taper and clamp centering drill. Start machine. Move center drill towards face end of workpiece by turning tailstock handwheel.

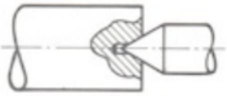
- It is best to make center bores on long workpieces with a hand drill. Mark center before drilling with a center ruler or a center punch.



Wrong: If center bore is not deep enough, the center would only touch the sharp corners.

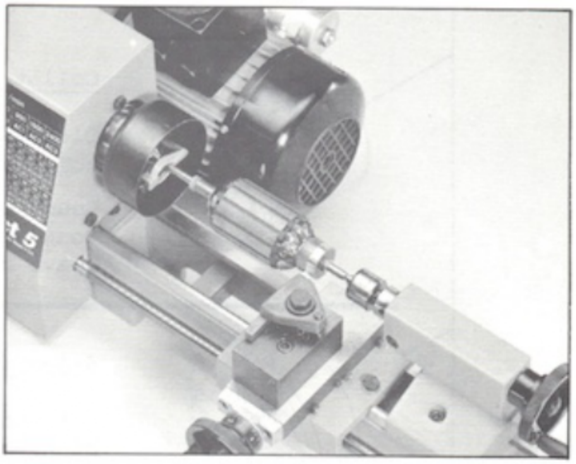


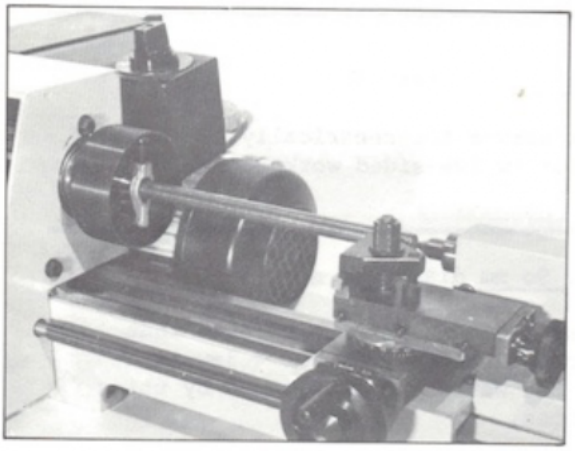
Correct: The center fits completely into the 60° center bore.



Working Example:

Turning a rotor
Spindle speed 950 rpm.





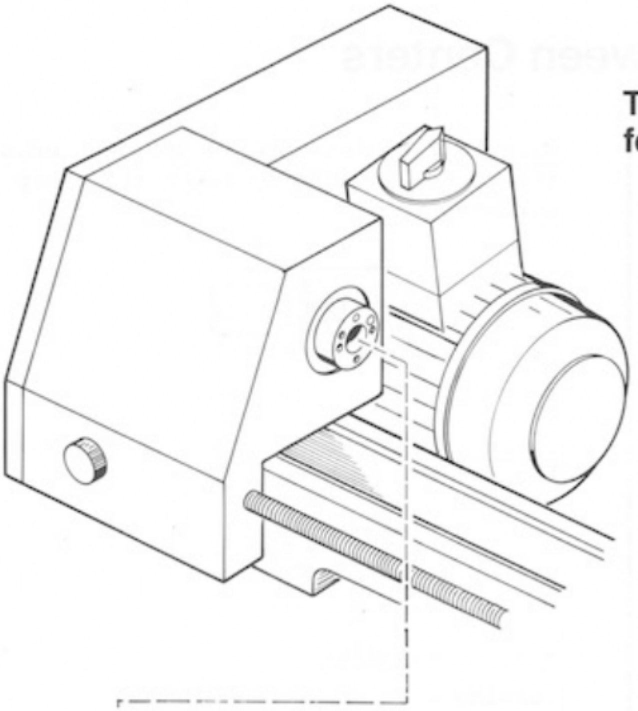
Mounting the Workpiece

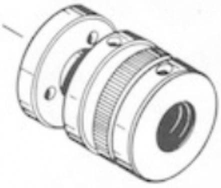
Mount lathe dog guard onto the spindle nose with the 3 allen screws M5 x 10. Clamp lathe dog on workpiece. Mount workpiece between centers.

Working Tip:

Continually lubricate contact points of workpiece - tailstock center or use revolving center.

Turning: Clamping Devices for Workpieces (Summary)

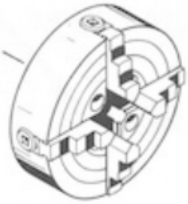




Collet chuck attachment

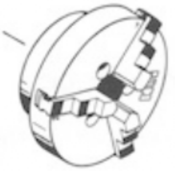
Clamping capacity 1,5 - 14 mm in connection with collets type ESX 25.

Round workpieces can be clamped with highest round-run accuracy using the collets. Collets leave no clamping marks on the workpiece.



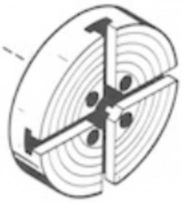
4-jaw independent chuck 9o mm diameter

With the 4-jaw independent chuck, workpieces can be clamped centrically and excentrically. Each jaw can be individually adjusted and reversed.



3-jaw chuck, 8o mm diameter

The 3-jaw chuck serves for centrically clamping round, hexagon or twelve-sided workpieces.



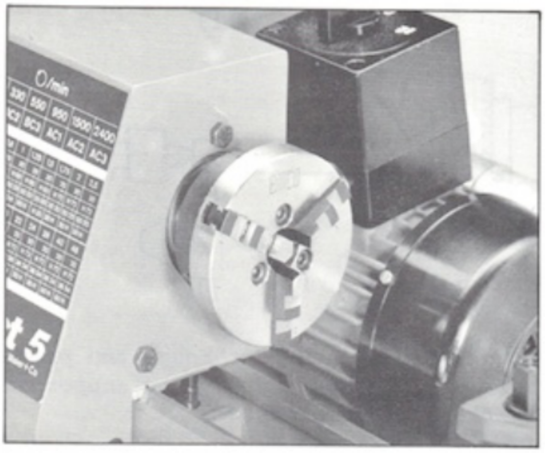
Clamping plate, 9o mm diameter

For clamping large-dimensioned workpieces that cannot be clamped with the 3-jaw or 4-jaw independent chuck. The workpiece is clamped by using the clamping shoes.

Clamping Devices – Working Examples

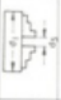
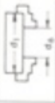
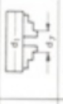
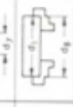
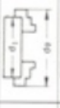
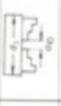
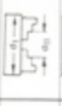
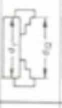
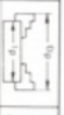
3-Jaw-Chuck, ∅ 80 mm

For centrically clamping of round, hexagon and 12-sided workpieces. Square workpieces cannot be clamped centrically with the 3-jaw chuck.



Clamping Capacities:

If the maximum clamping capacities are passed, there is the danger of breaking the jaw teeth. Safe clamping is no longer guaranteed.

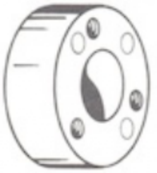
								
d_5 min.	d_6 max.	d_7 min.	d_8 max.	d_9 max.	d_{10} min.	d_{11} min.	d_{12} max.	d_{13} max.
1	36	21	80	104	5	29	84	104

Mounting

Spindle nose and chuck bore must be dust-free. Mount the 3-jaw chuck onto the spindle nose with the 3 allen screws (M5 x 3o, DIN 912).

Do not use longer screws - this would prevent the correct contact with the spindle nose.

Do not use shorter screws - the screws could break or tear out.



Threaded holes for 3-jaw chuck and lathe dog guard

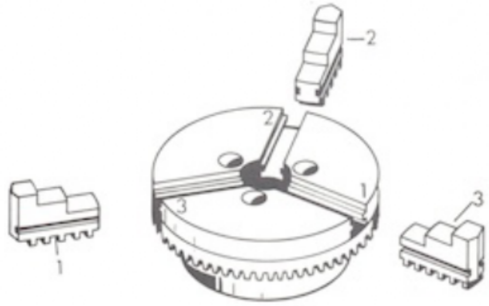
Reversing the Jaws

The jaws can be reversed: jaws mounted stepped outside or jaws mounted stepped inside. Note the correct mounting order for the jaws. Clean the jaws before reinserting.

A) Jaws stepped inside (external):

Turn the toothed tension ring until the beginning of the spiral thread comes to groove 1.

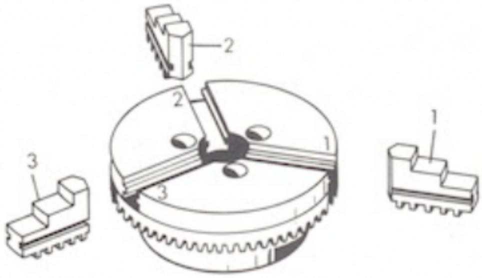
1. Insert jaw no. 3 into groove 1 and turn the tension ring until spiral comes to groove 2.
2. Insert jaw no. 2 into groove 2, turn tension ring.
3. Insert jaw no. 1 into groove 3.



B) Mounting the jaws, stepped outside:

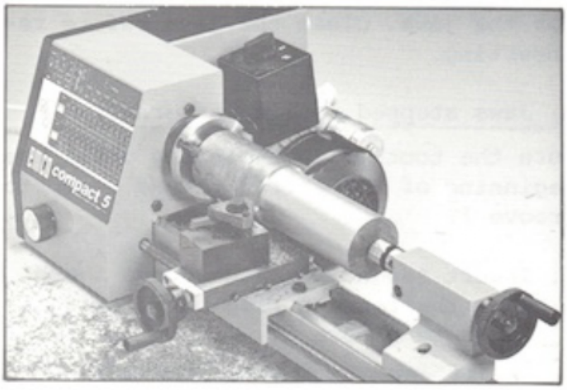
Inserting order:

1. Jaw no. 1 in groove 1
2. Jaw no. 2 in groove 2
3. Jaw no. 3 in groove 3



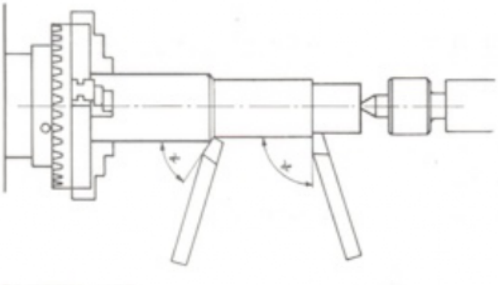
Working with 3-Jaw-Chuck, Working Tips

The workpiece is of steel, 65 mm diameter, spindle speed 2oo rpm, feed is o,14 mm/rev, turning tool: side tool, right, chip removal o,8 mm (see chart, page B).
The center bore was made with a hand drill.



An even surface is achieved with the automatic feed mechanism.
The chip form and the surface of the workpiece alters with the clamping angle "ϰ" of the turning tool. Try clamping the turning tool at different angles "ϰ".
The most advantageous angle depends on the workpiece material. In no case should the angle be smaller than 45°.

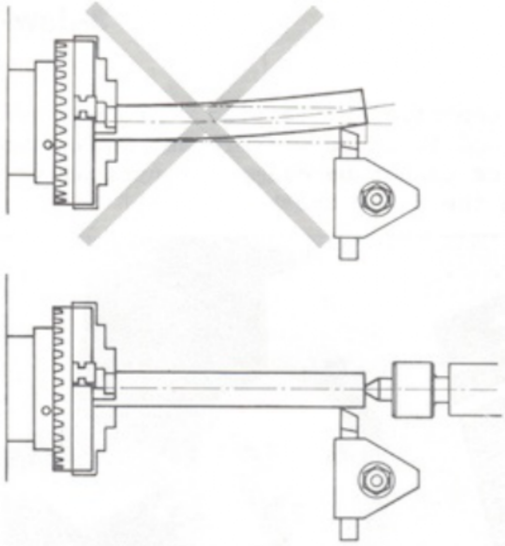
When working on thin workpieces, which have the tendency to bend, use a tool angle "ϰ" of 9o°.



SAFETY TIP

Never exceed the maximum clamping capacity of the chuck. (see page 19)
This could cause the chuck teeth to break - the jaws and the workpiece would be thrown out and could cause severe injuries.

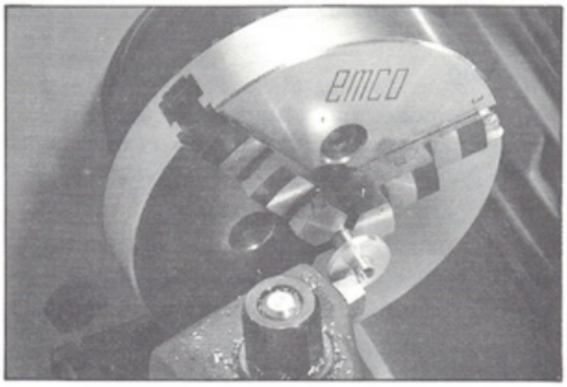
SUPPORTING LONG WORKPIECES



Long workpieces bend through the pressure of the tool and must be supported by the tailstock center.

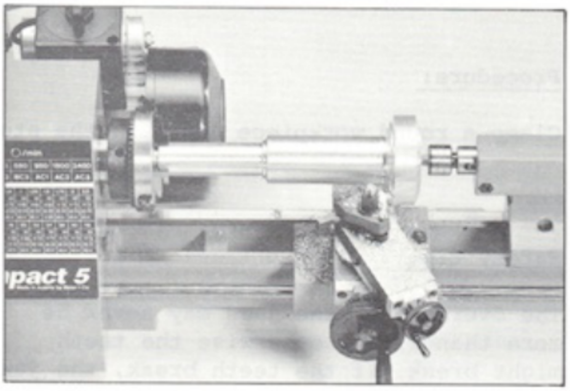
WORKING WITH THE REVOLVING CENTER

With spindle speeds over 55o rpm, it is recommendable to use the revolving center.



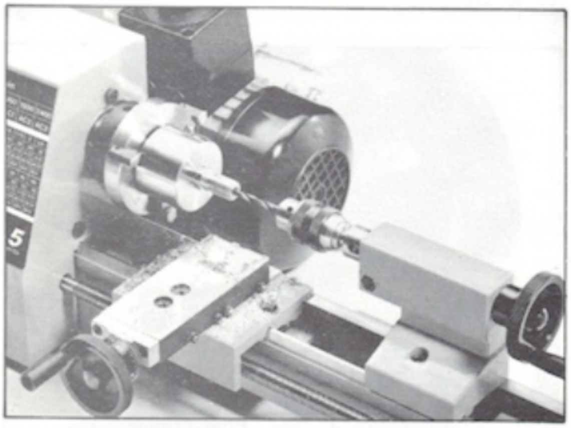
When turning off small diameters, the exact center height of the turning tool is especially important.

TURNING A STEPPED SHAFT



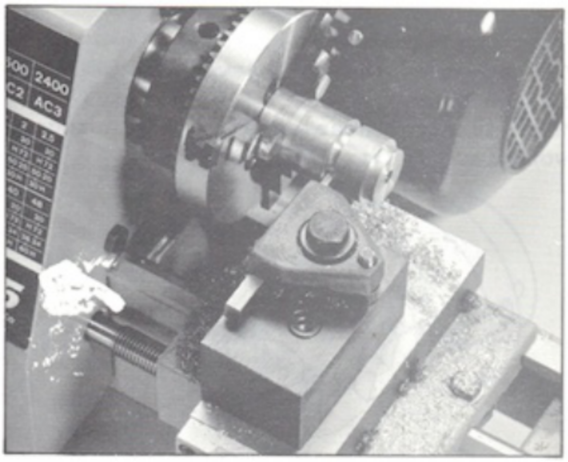
The speed must always match with the diameter of the workpiece. A spindle speed, which is too high, causes damage of the tool. Too slow cutting speeds may cause rough workpiece surfaces (for instance with aluminium alloys).

DRILLING



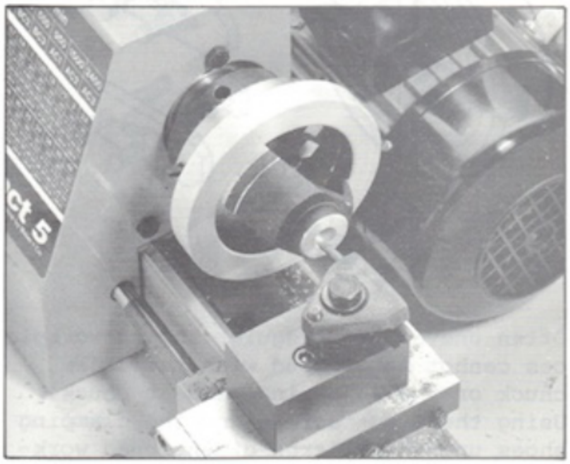
- *Turn back the drill so that the chips are removed from the bore.*
- *Use oil for lubrication and coolant*
- *The spindle speed for drilling depends on the bore diameter. See chart on side B. Simply exchange the workpiece diameter with the drill diameter.*

WORKING TIPS - PARTING-OFF



- *Clamp workpiece with as minimum overhang as possible, so that it is not bent by the pressure of the tool.*
- *The parting-off tool must be clamped at exact center height and at a right angle to the turning axis.*
- *Use low spindle speed*
- *Oiling enables easier parting-off*
- *Clamp longitudinal slide*

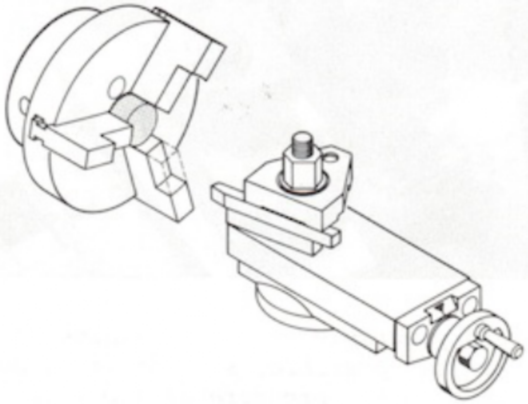
BORING



The workpiece is clamped internally. After a bore has been made with the 8 mm drill, you can start with the boring tool.

Soft jaws for the chuck

The steps of the soft jaws must be turned by the user.
When turning these steps, clamp a round workpiece to fix the jaws.



Procedure:

Clamp a round workpiece and turn the step.

Safety tip:

The overhang of the jaws may never be more than 12 mm, otherwise the teeth might break. If the teeth break, the jaw could be thrown out and cause severe injuries.

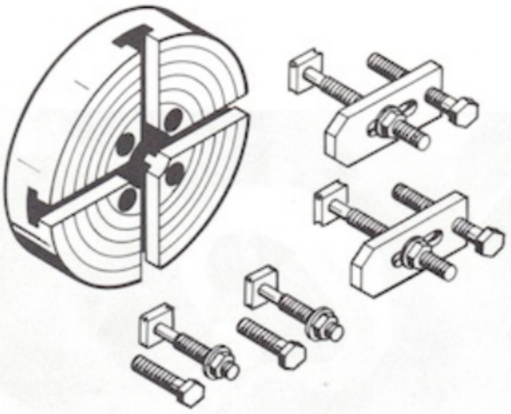
SAFETY TIP:

The steps must be turned so deep that the workpiece is clamped securely.

The Clamping Plate 90 mm diameter

Clamping capacity using the small T-nut screws: up to 13 mm

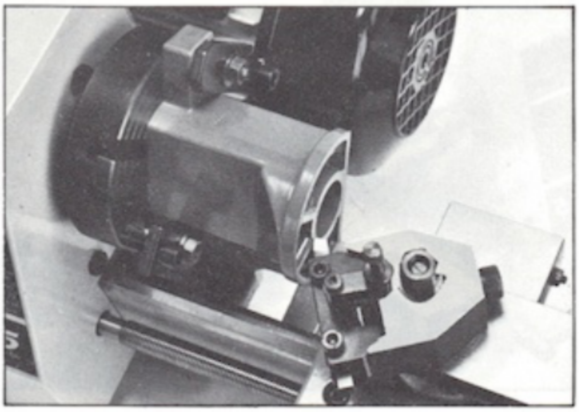
Clamping capacity using the big T-nut screws: up to 33 mm



Often uneven or irregular shaped workpieces cannot be clamped with the 3-jaw chuck or the 4-jaw independent chuck. Using the T-nut screws and the clamping shoes, uneven or large-dimensioned workpieces can be clamped. The rings turned into the clamping plate serve as an aid for centrical clamping.

Mounting

Mount the clamping plate onto the spindle nose with the 4 socket head screws M5 x 2o.

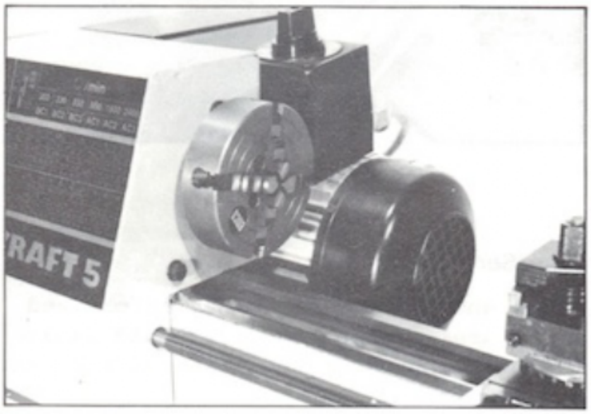


Safety Tip:

Uneven workpieces often cause unbalanced round-run. Therefore always work with low spindle speeds. Be careful of extending parts.

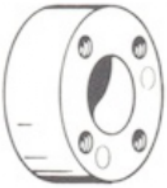
The Independent Chuck, ∅ 90 mm

For clamping round, square, rectangular and uneven shaped workpieces.
Each jaw can be adjusted individually.
Workpieces can be clamped centrically and excentrically.



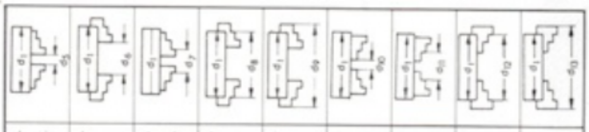
Mounting

Mount the independent chuck to the spindle nose with the 4 allen screws (M5 x 25, DIN 912).



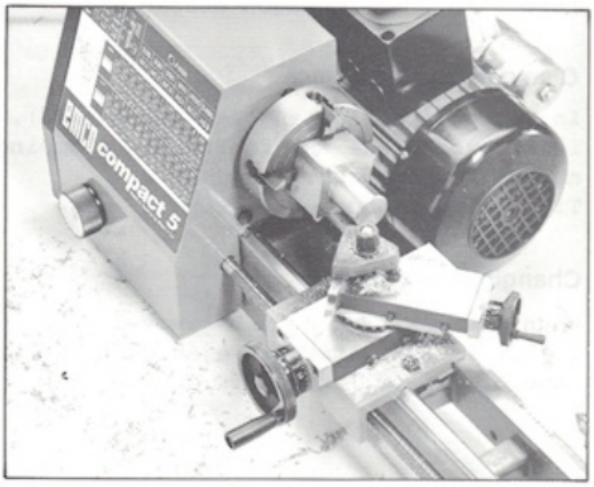
Threaded bores for independent chuck.

Clamping Capacities



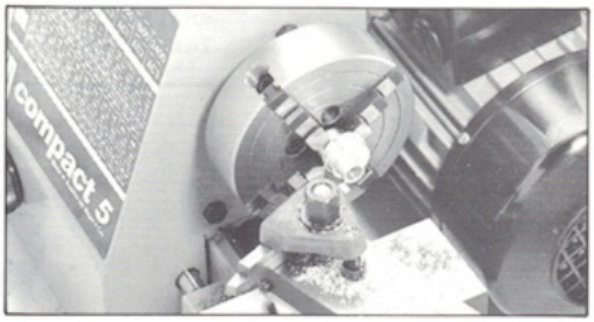
d_5 min.	d_6 max.	d_7 min.	d_8 max.	d_9 max.	d_{10} min.	d_{11} min.	d_{12} max.	d_{13} max.
1	42	21	86	110	9	29	90	110

The rings turned into the independent chuck provide a means of orientation for centric or excentric clamping of workpieces.



Example:

Square material (workpiece) cannot be clamped centrically in 3-jaw chuck.



Turning a crank

The Collet Chuck Attachment for the Lathe

Clamping capacity 1,5 - 14 mm using the collets type ESX 25.

Round workpieces can be clamped with highest round-run accuracy using the collets. Collets leave no clamping marks on the workpiece.

Mounting

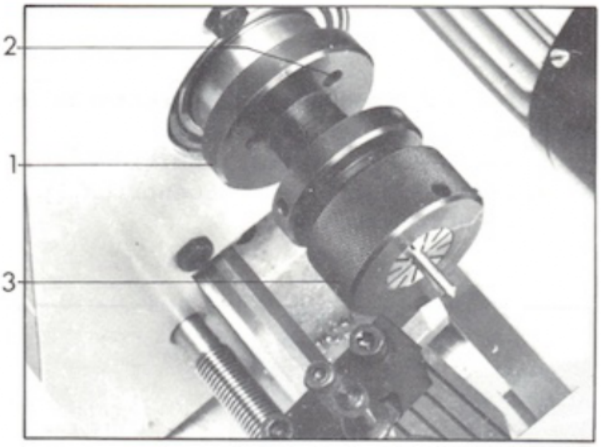
Mount collet holder (1) onto the spindle nose with the 3 hexagon screws (2).

Clamping the workpiece

Insert collet, loosen clamping nut (3), insert workpiece and re-tighten clamping nut with the socket head key.
Tightening is done clockwise!

Changing the collets

When the clamping nut is removed, the collet is automatically ejected from the cone of the collet holder.



Care/Service

Clean and oil collet holder before and after use - chips and dirt could damage the clamping taper and cone and influence the precision.

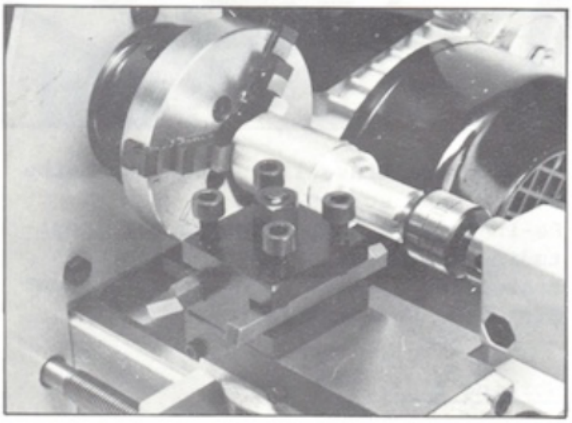
The ESX 25 Collets

The metric and inch clamping capacity is engraved in the collets. Larger or smaller diameters cannot be clamped.

The Two-Way Toolholder

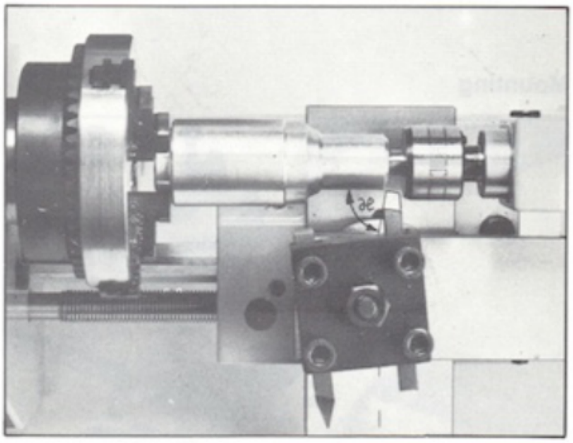
Max. tool section: 6 x 6 mm

The 2-way toolholder can only be mounted onto the top slide. In order to reach the exact center height, spacers must be used.



Working tips:

The 2-way toolholder can be turned. This enables easy adjusting of the clearance angle "$\varkappa$". The clearance angle "$\varkappa$" influences the type of chips and the surface quality. Try it and see!



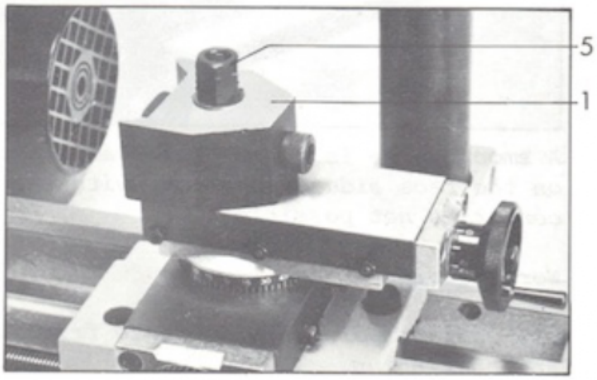
The Quick-Change Toolholder

Max. tool section: 8 x 8 mm
Can only be mounted on top slide.

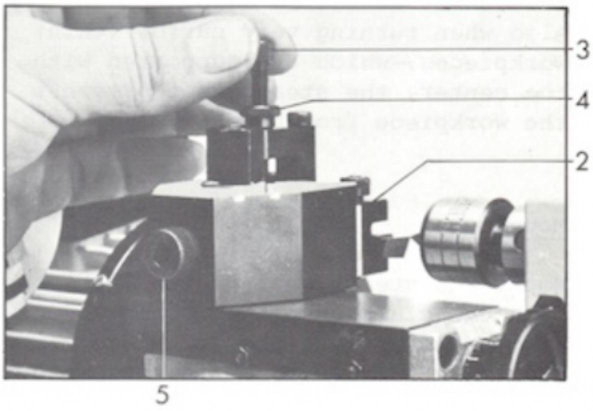
Should several tools be necessary for turning a certain workpiece, continual changing of tools would be very time-consuming.
With the quick-change toolholder, the tool can be clamped beforehand and adjusted to exact center height.

Mounting

+ Set basic element (1) onto the top slide.



+ Clamp the tool in the toolholder (2) and mount onto the basic element from the top.
+ Adjust center height with the knurled screw (3), tighten knurled nut (4). The knurled screw is thereby fixed in the adjusted height.
+ Tighten socket head screw (5); the toolholder is clamped.
+ Clamp the basic element in the required angle with the hexagon screw.

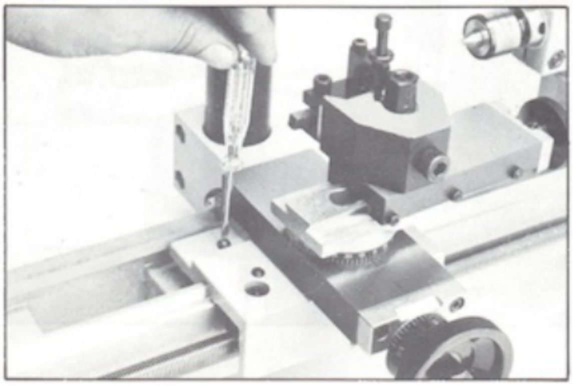


The Travelling Steady

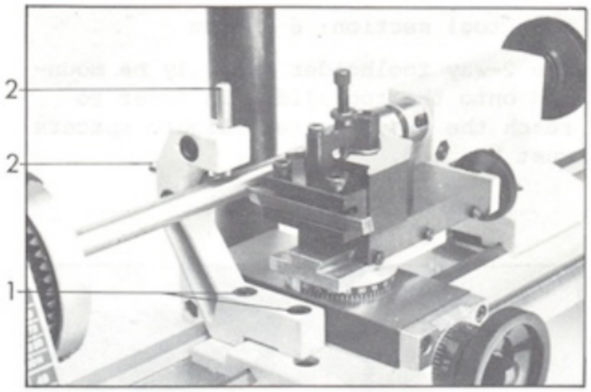
For long round workpieces with diameters from 4 - 25 mm.

Narrow workpieces bend under the pressure of the turning tool. The workpiece would not be cylindrically.
The supporting pins of the travelling steady support the workpiece near the tool and prevent bending.

Mounting



Remove the 2 set screws on the longitudinal slide.



Tighten the travelling steady with the socket head screws (1).
Re-insert the set screws in the longitudinal slide after dismounting the travelling steady, in order to prevent dirt from damaging the threads.

Working tip:

When adjusting the pins (2), do not bend the workpiece.
Continually oil the contact points pin-workpiece.

The Steady Rest

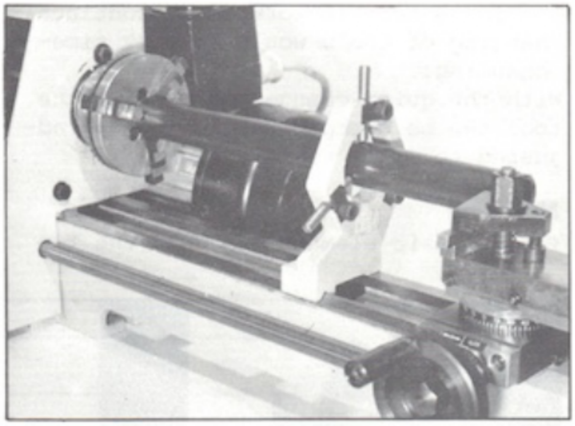
Capacities:

Smallest workpiece diameter: 2 mm
Largest workpiece diameter: 4o mm

With some work, such as boring, drilling, turning pipes, taper turning, etc., the steady rest is necessary for supporting the workpiece, since the center cannot be used.
Also when turning very narrow (thin) workpieces, which are supported with the center, the steady rest prevents the workpiece from bending.

Mounting:

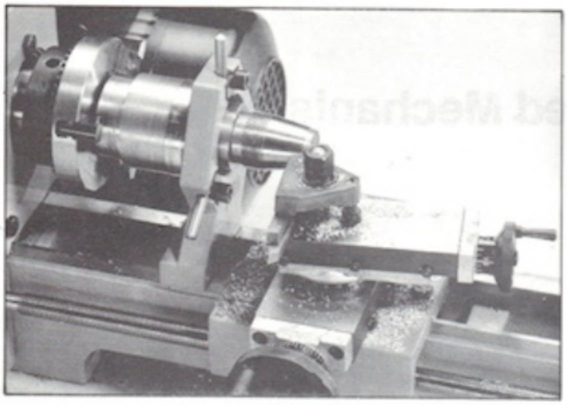
Mount the steady rest on the lathe bed with the clamping plate. Clamp the slide pins so that the workpiece is centrally supported, but not clamped.



A smooth pipe is turned internally and on the face side, supporting with the center is not possible.

Working tip:

Oil contact points to decrease friction and heating up.



At the end of the shaft, a taper is turned; the steady rest prevents a possible movement (pressing out of position) of the workpiece.

Follow all Accident Prevention Rules!

Always wear Safety Goggles. Foresight is better than no Sight!

Never surpass the Clamping Capacity of the Lathe Chuck and the Independent Chuck!

Always check the Workpiece before Working – is it securely clamped?

The Automatic Feed Mechanism

Delivered Units

+ Coupling with control knob
+ Quadrant with 6 gear wheels
+ 3 shear pins
+ 2 spacers

Function

a) Turning with automatic longitudinal feed:

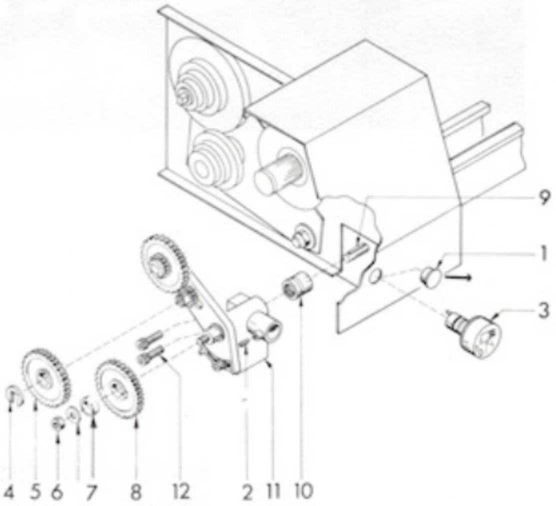
- You save turning the longitudinal slide handwheel
- The surface of the workpiece is even.

b) Thread-cutting:

- With the exception of the two feeds (o,o7 and o,14 mm per main spindle revolution) you can cut 5 metric threads: o,4/o,6/1,o/1,25/1,5 mm.
- With the change gear set you can cut additionally 1o metric threads and 14 inch threads (see technical data).

Mounting

- Remove plastic plug (1)
- Loosen set screw (2) and pull out control knob (3)
- Remove washer (4) and gear wheel 6o (5)
- Unscrew hexagon nut (6), remove washer, spacer (7) and gear wheel 6o (8).
  The gear wheels must be dismounted, so that the coupling housing can be mounted with the allen screws (12).
- Remove the tape on the leadscrew - its purpose was to hold the parallel key (9).



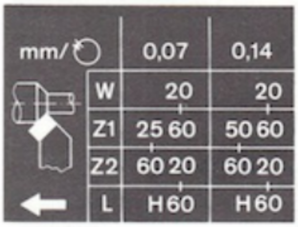
- Remove coupling (1o) from the coupling house (11) and slip it onto the leadscrew.
- Mount coupling housing onto the coupling with the 2 allen head screws (12). The allen head screws should not be tightened yet.
- Insert control knob (3) into the coupling housing. The pin on the control knob must be engaged with the groove in the coupling.
- Lightly tighten set screw (2). The set screw is for axial securing the control knob.
- Move longitudinal slide to left towards spindle stock to center the lead screw shaft and fasten the socket head screws (12).
- Mount gear wheels (note the instructions about mounting the gear wheels, see next pages).

Mounting the Gears

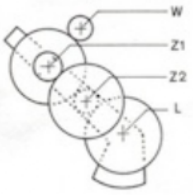
On the front panel the gear combinations for the two feeds (o,o7 and o,14 mm/rev) and for the thread pitches are indicated.

Example of mounting:

Required feed size: o,o7 mm/rev. On the top left side of the front panel, you will find the gear wheel combination.



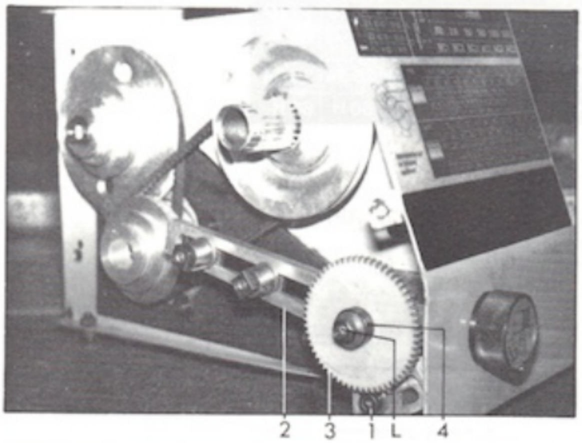
mm/⭮		0,07	0,14
	W	20	20
	Z1	25 60	50 60
	Z2	60 20	60 20
←	L	H60	H60



Steps for Mounting the Gears

W	
Z1	
Z2	
L	H 60

① Loosen the allen head screw (1) and swivel the quadrant (2) downwards. Mount gear wheel 6o (3) and spacer H (4) onto the leadscrew (L). Fix gear wheel and spacer with the ring washer and the hexagon nut.



W	
Z1	
Z2	20
L	H 60

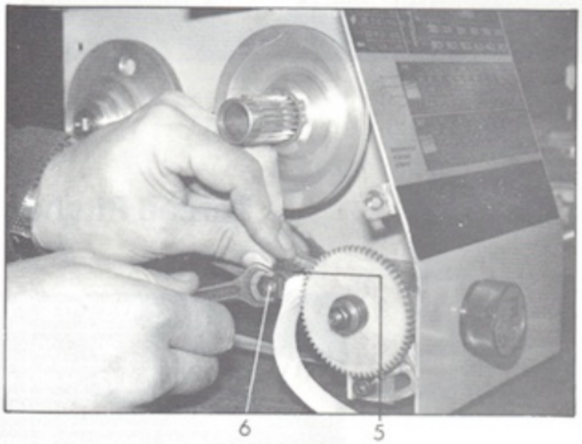
② Mount gear wheel 2o (5) onto the axis Z2 (6). Clamp axis Z2, so that gear wheel 6o and gear wheel 2o are engaged.

Correct Play of the engaged Gear Wheels

A small amount of play must be present, otherwise the gears would wear out quickly. This play in no way influences the accuracy of the thread pitch.

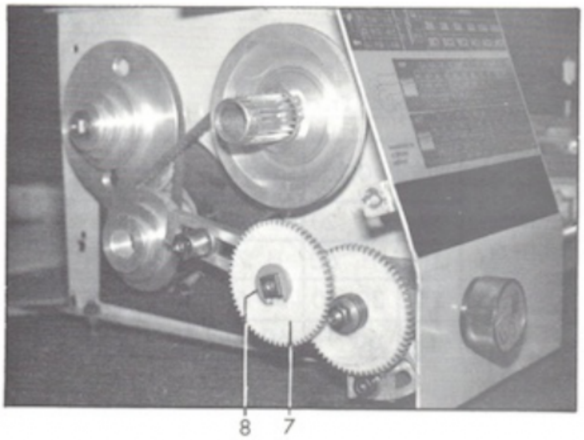
Recommended method:

Place a piece of paper between the gears; press the engaging gears together and clamp axis Z2. Remove paper.



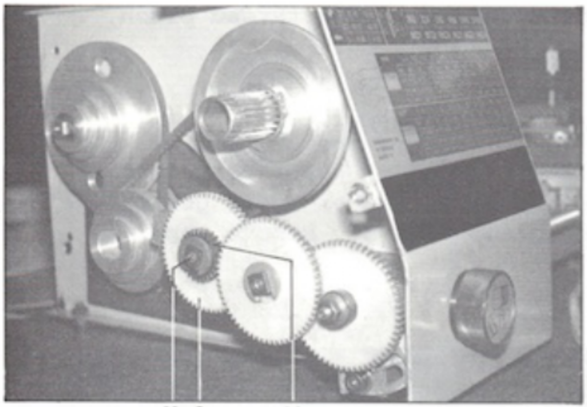
W	
Z1	
Z2	60 20
L	H 60

③ Mount gear 6o (7) onto axis Z2. Place ring (8) onto Z2 in order to fix gears axially.



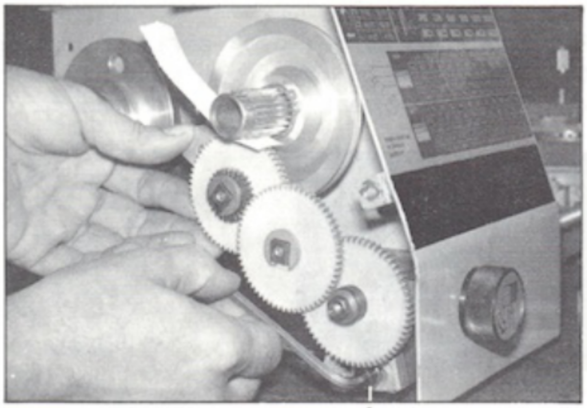
W	
Z1	25 60
Z2	60 20
L	H 60

④ Mount gears 6o (9) and 25 (1o) onto axis Z1 (11). Clamp axis Z1 so that tooth surface play is present. Mount ring for axial fixing.



W	20
Z1	25 60
Z2	60 20
L	H 60

⑤ Swivel quadrant upwards a clamp with socket head screw (1). Note tooth surface play.



Thread Pitches – Gear Combinations

mm		0,4	0,5	0,6	0,7	0,8	1	1,25	1,5	1,75	2	2,5
	W	20	20	20	20	20	20	20	20	20	20	20
	Z1	H 60	H 72	H 60	H 72	H 72	H 60	H 60	H 60	H 72	H 72	H 72
	Z2	20 25	25 30	60 50	35 25	20 25	50 25	50 20	25 50	35 20	50 25	50 20
	L	60 H	50 H	60 H	60 H	30 H	60 H	60 H	H 20	30 H	30 H	30 H
n/1"		10	11	12	14	16	20	22	24	28	40	48
	W	20	20	20	20	20	20	20	20	20	20	20
	Z1	H 60	H 72	H 60	H 60	H 60	H 60	H 72	H 72	H 72	H 72	H 72
	Z2	72 34	60 26	72 34	72 34	72 34	72 34	60 26	36 34	36 34	36 34	36 34
	L	25 H	30 H	30 H	35 H	40 H	50 H	60 H	30 H	35 H	50 H	60 H

ADDITIONAL THREAD PITCHES, WHICH ARE NOT SHOWN ON THE FRONT PANEL

Metric Threads

mm/ɑ	0.25	0.3	0.35	0.75
W	20	20	20	20
Z1	H 60	H 72	H 72	H 72
Z2	30 60	30 50	35 50	25 50
L	60 H	60 H	60 H	H 40

Inch Threads

n/1"	18	32	36
W	20	20	20
Z1	H 72	H 72	H 72
Z2	40 25	36 34	40 50
L	34 H	40 H	34 H

Working Tips – Thread-Cutting

Metric and Inch Threads, the Chart on the Spindle Stock

All threads and their geometrical sizes and shapes are standardized. The thread charts (see page 18) show the gear combination for the respective thread pitch.

Metric threads:

The pitch size "p" is given in mm with metric threads.

Inch threads:

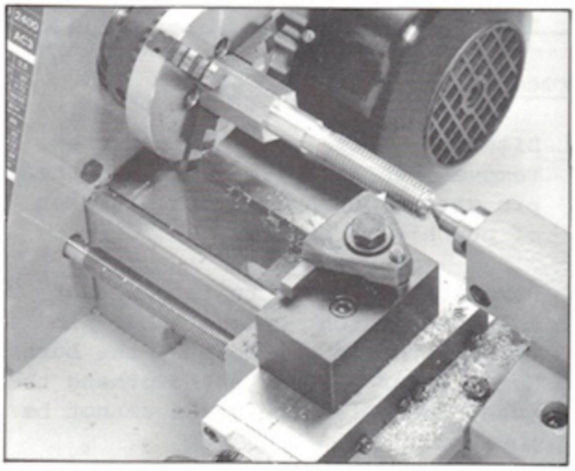
The inch threads are defined by the number of threads per inch (abbreviation: tpi, symbol: n/1").
For example: 1o tpi or n/1" means 1o threads per inch. The actual pitch size is:

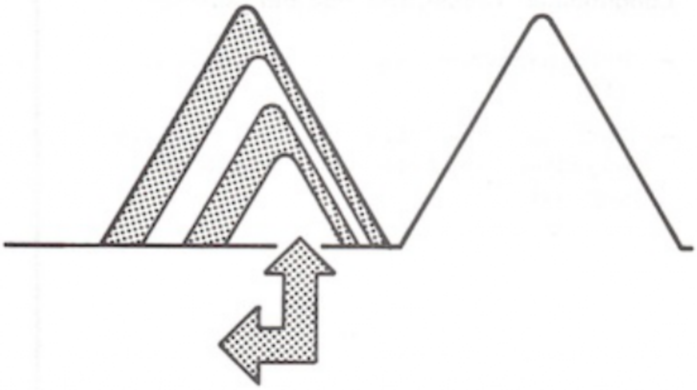
$$\frac{1\text{ inch}}{1o} = \frac{1''}{1o} \text{ or } o{,}1''$$

Procedure

- + Tool must be clamped at an exact right angle to the turning axis.
- + Mount gears for required pitch (see pages 17/18)
- + Choose spindle speed so, that you have enough time to turn back the cross slide and switch off the machine.
- + It is recommendable to use oil as lubricant.

Each thread has to be cut in several steps. The cutting depth must not be large. Turn back the cross slide at the end of one cut, reverse the motor to bring the tool to the start position. - Adjust the tool to a new cutting depth using the dial on the cross slide handwheel.
THe top slide is recommendable for thread-cutting to adjust the tool sidewards, as shown in the illustration.

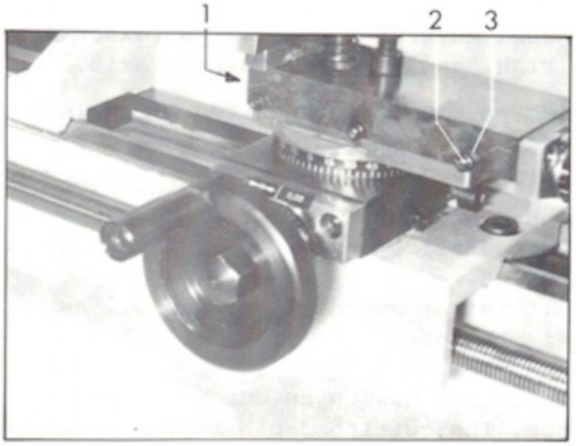




Adjustments

Playfree Re-Adjustment of Cross Slide and Top Slide Guidance

The dovetail guideways are fitted with gibs (1). With the set screws (2), which press on the gibs, the play-free slide guidance is adjusted. The hexagon nuts (3) serve for securing the set screws in adjusted position.

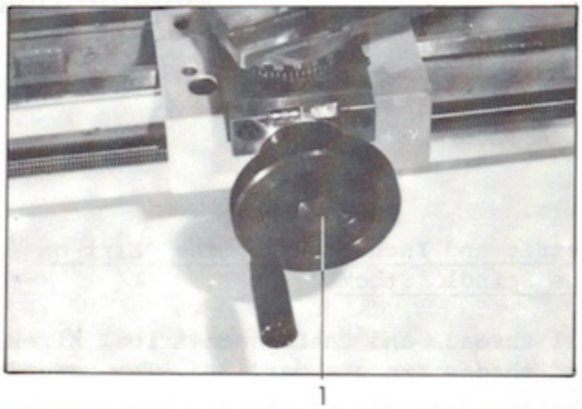


Adjustment:

Loosen hexagon nuts, adjust set scews until the slides run without play. Hold set screws in the adjusted position with a screwdriver and tighten the hexagon nuts.

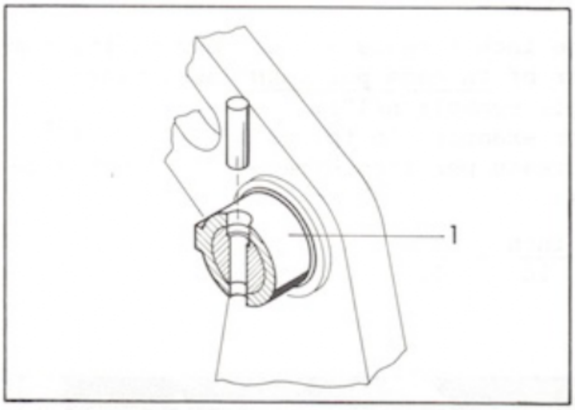
Adjustment of the Handwheel Clamping on Longitudinal-, Cross-, Top Side and Tailstock

- Hold handwheel and loosen cap nut (1).
- Turn handwheel inwards, hold in the adjusted position and re-tighten cap nut.



Changing the Shear Pin

If the shear pin should break, due to overload or incorrect handling of the machine (if the automatic feed is switched on while longitudinal slide is clamped), a new original shear pin must be inserted.



Procedure:

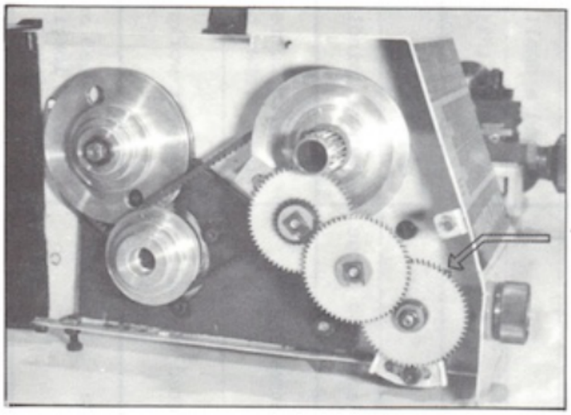
- Dismount gears from the leadscrew, remove bush (1), remove broken shear pin with a punch (maximum diameter of punch: 2,5 mm).
- Remount bush and turn it, so that the bores match - press shear pin through the larger bore of the bush. Note: Shear pin may not overhang the bush, otherwise the gears cannot be mounted.

USE ONLY ORIGINAL SHEAR PINS!

Lubrication

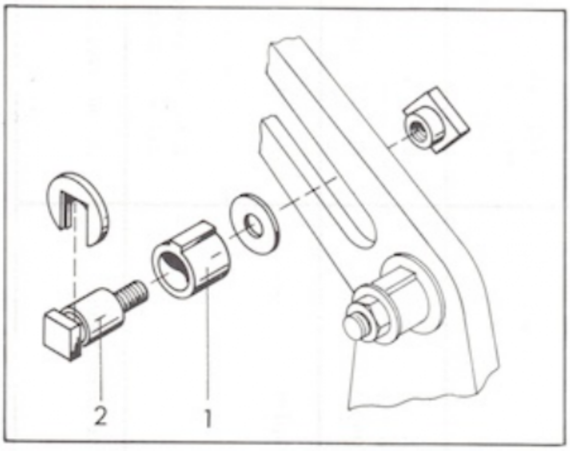
Interval approx. 20 Working Hours

Oil coupling bolt through the opening of the feed housing (1), with an oil can (light machine oil).



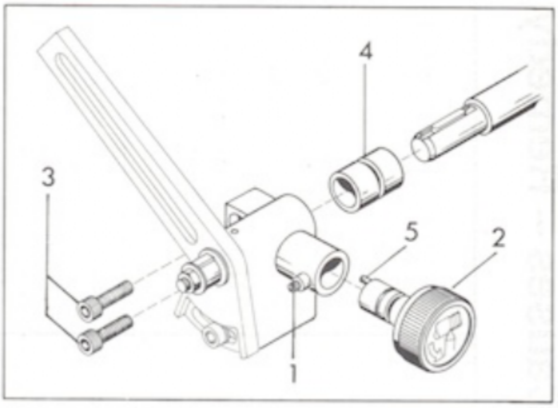
Interval approx. 50 Working Hours

Bushes and bolts (axis Z1,Z2) on the quadrant: remove gears, unscrew bolts. Oil bush (1) and bolt (2).



Interval approx. 200 Working Hours

Coupling in housing:



1. Dismount gears, unscrew set screw (1) until you can pull out the control knob (2).

2. Move longitudinal slide towards spindle stock (for centering leadscrew).

3. Unscrew the 2 allen head screws (3) and remove feed mechanism.

4. Remove coupling (4) from the feed gear housing and lubricate with grease.

5. Re-mounting:
   - Place coupling (4) onto leadscrew and mount feed mechanism housing with the two allen head screws.
   - Insert control knob, so that bolt (5) is in the groove of the coupling; turn set screw (1) until it touches bottom of groove, then turn 1/4 revolution back again.

Problems – Possible Causes – Remedy

Chattering	Spindle speed is too high or too low	Decrease or increase spindle speed. It could happen that the eigenfrequency is identic with the spindle speed.
	Machine not bolted down	Bolt machine to even workbench
	Too much tool overhang	Clamp tool with smallest overhang possible
	Long or narrow workpiece not supported either by tailstock center or by fixed steady. Workpiece bends through the power generated by the cutting operation.	Support workpiece with tailstock center or fixed steady. Sharpen tool. Increase adjusting angle to 90°.
	Cutting tool dull, or cutter angles not correct	Grind cutting tool
	Main cutting edge not on center height	Adjust cutter to center height
	Play in the slide guideways	Adjust slides playfree
	Increased cutting depth "a"	Reduce cutting depth
Rough surface	Dull tool	Sharpen tool
	Tool is too pointed	Grind a small radius to the tool point
	Play in the slide guideways	Adjust slides playfree
Machine stopped or speed is reduced strongly	Dull tool	Grind tool
	Spindle speed to high, or cutting depth too large	Reduce spindle speed and cutting depth
Workpiece not round	Tailstock center does not fit to center bore	Machine correct center bore, adjust tailstock center into center bore
	Long or narrow workpiece not supported by tailstock center or fixed steady	Support workpiece
Shear pin breaks	Drive overloaded, longitudinal slide clamped	Reduce feed and/or cutting depth. Loosen hexagon bolt on longitudinal slide.

Drilling – Milling

With the vertical milling and drilling unit, the Compact 5 can be converted into a drilling machine and a universal milling machine.

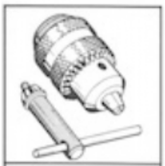
Note:

The name "vertical milling and drilling unit" has become well known, but it is not descriptive. It is really a universal milling and drilling unit, since the milling spindle can be used for milling not only vertically, but in any required angle position.

Index Drilling – Milling

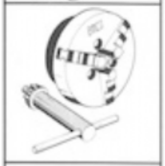
Accessories (summary) 36-37
Accident Prevention 37
Technical Data 38
Electrical Connection 38
Mounting the Vertical Unit - Operating elements 39/4o
Vertical Fine Feed Attachment 4o
The Spindle Speed 41
Drilling - General tips 42
Milling - General tips 43-45
Clamping tools for drill and mill 46/48
Clamping tools for workpieces 47/49/5o
Dividing Attachment 51-54

Accessories for milling and drilling attachment



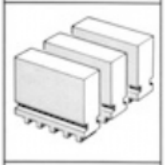
Three-jaw drill chuck
capacity 1 to 8 mm, with M 14x1 mounting thread

Order No. 152 500



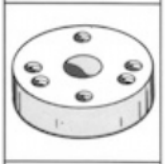
Three-jaw lathe chuck
80 mm dia., with scroll, reversible jaws, and tee-handle pinion key

Order No. 200 410



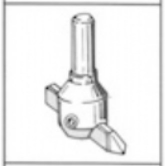
Set of 3 soft jaws
Technical tip: For three-jaw lathe chuck Order No. 200 410

Order No. 200 430



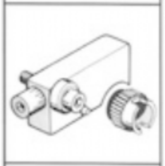
Support flange
Technical tip: For mounting three-jaw lathe chuck Order No. 200 410, four-jaw independent chuck Order No. 200 360,
collet attachment Order No. 200 040

Order No. 200 250



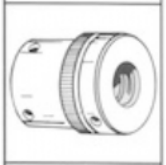
Facing and boring head (Fly cutter)
with 1 ground facing and boring tool, 2 unground tools, operating key

Order No. 150 100



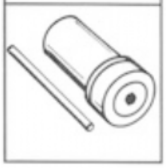
Vertical fine feed attachment
1 division = 0.1 mm

Order No. 151 110



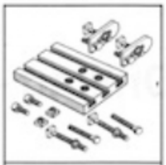
Collet attachment
for collets type ESX-25, gripping capacity 1.5–14 mm

Order No. 200 050



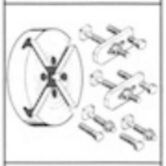
Cutter arbor
for tooth milling cutters and circular saw blade

Order No. 151 070



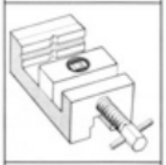
Milling table
with 2 clamps, can be mounted on cross slide for fixing or clamping large-surface workpieces

Order No. 150 350



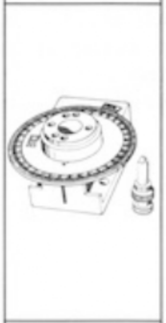
Clamping plate
90 mm dia., with 2 clamps
Technical tip: Fits on spindle of headstock and dividing attachment Order No. 200 320

Order No. 200 360



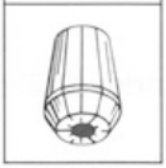
Machine vice
Clamping range 32 mm
Width of jaws 46 mm
Height of jaws 18 mm

Order No. 200 310



Dividing attachment
with integrated dividing plate for direct dividing.
22 possible divisions: 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15, 16, 18, 20, 24, 28, 30, 36, 48, 56, 60
Technical tip: Chucking means that can be used –
Three-jaw lathe chuck Order No. 200 410
Clamping plate Order No. 200 360
Four-jaw independent chuck Order No. 200 420
Collet attachment Order No. 200 040

Order No. 200 320



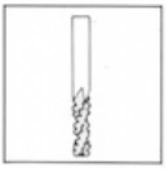
Set of 14 collets ESX-25
in wooden case, gripping capacity from 1.5–14 mm

Order No. 225 000

Individual collets ESX-25

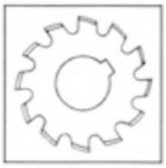
Nominal dia. in mm	Chucking capacity in mm	Shaft dia. in inches	Order No.
2,0	1,5–2,0	1/16–5/64	**225 020**
2,5	2,0–2,5	3/32	**225 025**
3,0	2,5–3,0	7/64	**225 030**
4,0	3,0–4,0	1/8–9/64–5/32	**225 040**
5,0	4,0–5,0	11/64–3/16	**225 050**
6,0	5,0–6,0	13/64–7/32–15/64	**225 060**
7,0	6,0–7,0	1/4–17/64	**225 070**
8,0	7,0–8,0	9/32–19/64–5/16	**225 080**
9,0	8,0–9,0	21/64–11/32	**225 090**
10,0	9,0–10,0	23/64–3/8–25/64	**225 100**
11,0	10,0–11,0	13/32–27/64	**225 110**
12,0	11,0–12,0	7/16–29/64–15/32	**225 120**
13,0	12,0–13,0	31/64–1/2	**225 130**
14,0	13,0–14,0	33/64–17/32–35/64	**225 140**

Tools for vertical milling and drilling attachment



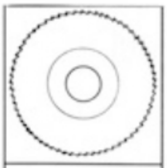
Heavy-duty end mill
high speed steel with roughing toothing, shaft dia. 8 mm

Order No. 764 200



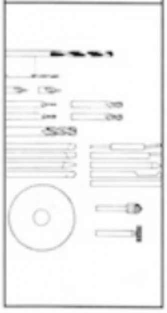
Set of 6 gear mills
dia. 40 mm. Module 0.5 (No. 1–6)

Order No. 152 110



Circular saw blade
for metal, 60 mm dia.

Order No. 123 100



Tool assortment, large
15 twist drills, 1–8 mm dia. in steps of 0.5 mm
2 center drills 1.5 mm dia.
4 grooving cutters dia. 3, 4, 5, 6 mm
1 roughing mill dia. 8 mm
8 turning tools, ground, assorted
1 turning tool, unground
1 circular saw blade for metal dia. 60 mm
1 countersink 90°
1 T-slot cutter Ø 16x4 mm

Order No. 152 100

Individual gear mills

Ø 40 mm, module 0,5, No. 1, for 12–13 teeth	**Order No. 764 601**
Ø 40 mm, module 0,5, No. 2, for 14–16 teeth	**Order No. 764 602**
Ø 40 mm, module 0,5, No. 3, for 17–20 teeth	**Order No. 764 603**
Ø 40 mm, module 0,5, No. 4, for 21–25 teeth	**Order No. 764 604**
Ø 40 mm, module 0,5, No. 5, for 26–34 teeth	**Order No. 764 605**
Ø 40 mm, module 0,5, No. 6, for 35–54 teeth	**Order No. 764 606**

Tool assortment, small
1 twist drill each 2, 3, 4, 5 mm dia., 1 center drill 1,5 mm dia.,
1 countersink 90°, 1 grooving cutter 4 mm dia.,
1 T-slot cutter 16x4 mm dia.

Order No. 119 000

Service parts set
2 V-belts, 10 shear pins, 2 washers, 2 grooved pins

Order No. 200 990

Accident Prevention: Milling – Drilling

+ Always follow the rules for accident prevention on page 3!

Additional tips:

+ Clamping the workpiece
When drilling or milling, the workpiece must be clamped securely, in order to prevent the workpiece from being loosened by the cutting force of the tool.
Clamping tools: machine vice, milling table with clamping shoes, 3-jaw chuck, 4-jaw independent chuck ...

+ Work only with perfectly ground and sharpened tools!

+ Close belt cover before switching on machine.

+ Remove milling and drilling chips only with brush and only when machine is not switched on.

+ Loose clothing and hairs can be especially dangerous! Hair or clothing can easily get caught in the spiral grooves of the millers and drills.

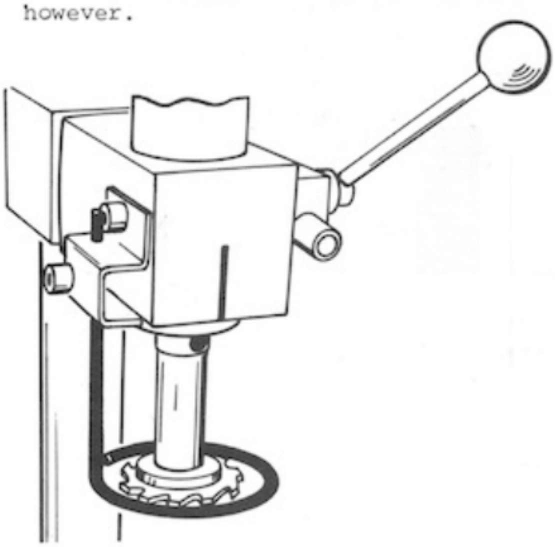
+ Never wear rings when working!

+ Never clean machine while it is running.

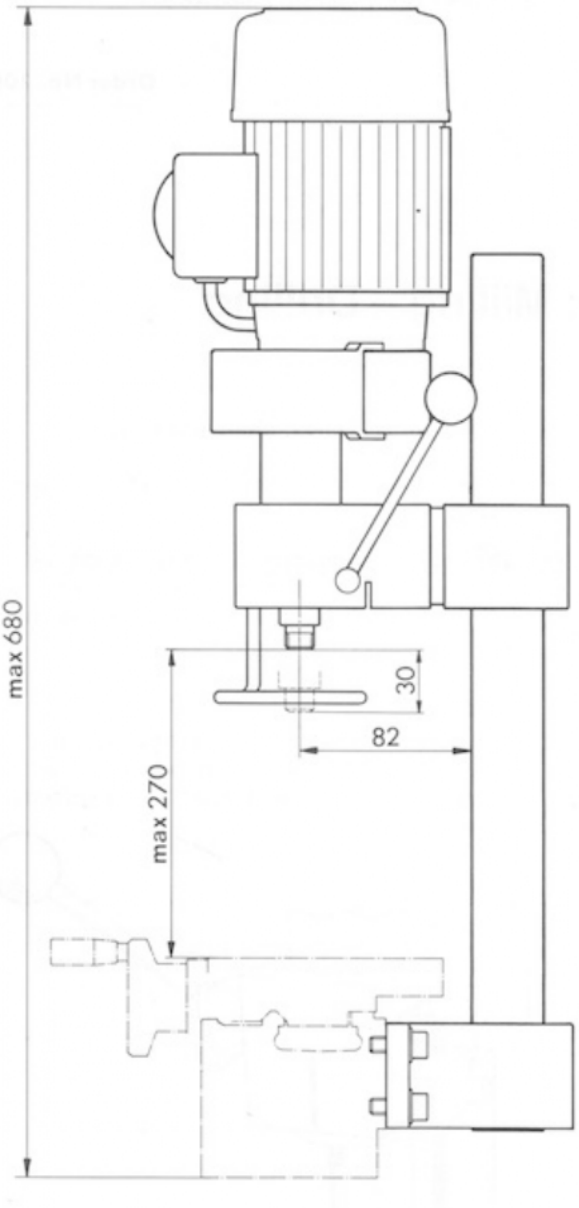
+ The milling guard: the ring must be clamped so, that the tool (miller, circular saw blade) is covered when in the uppermost position.

Note:

To enable better illustration, the milling guard is not shown in some drawings. The guard must be mounted, however.



Technical Data



Motor:

IEC-standard single-phase motor, dust and splashproof according to IP 44

Input power (P1) 2oo W, S3-6o % ID

Output power (P2) 1oo W, S3-6o % ID

For voltage and frequency - see label on motor.

Spindle speeds: 38o/7oo/16oo rpm

Spindle nose (main spindle):

according to factory standard, with M14 x 1 thread.

Weight: 6,5 kg

For dimensions - refer to sketch

Electrical Connection

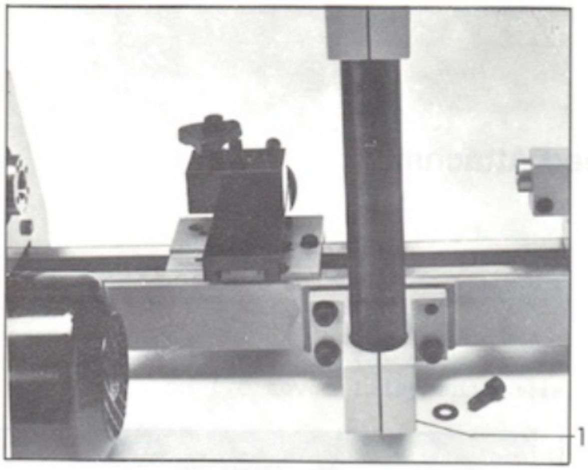
The vertical milling and drilling unit may only be plugged into outleds with grounding contacts (a grounding receptical must be available for connection of the machine).

Mounting the plug:

Due to the different requirements in different countries, the machines are not delivered with plugs everywhere. Mounting of plugs must be carried out professionally!
Clamp the grounding wire (yellow-green) to the grounding contact (symbol ⊕).
Clamp the other two wires to contact R and N.

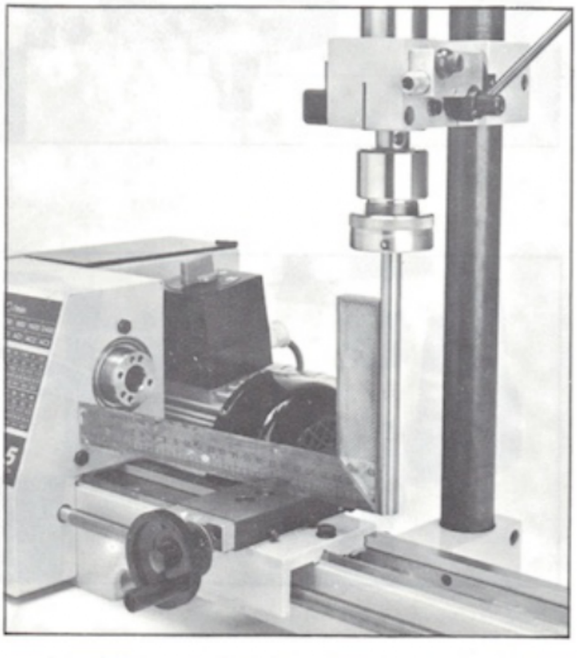
Mounting the Vertical Unit – Operating Elements

Attach the base to the lathe bed with the 4 socket head screws and washers. Clean contact surfaces thoroughly before mounting.



Fixing the vertical column

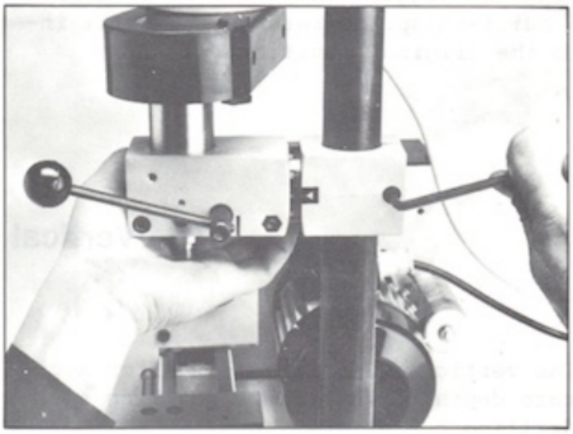
Tighten the two socket head screws (1).



Vertical adjustment

The base must be clamped so, that the vertical column is at a right angle to the cross slide.

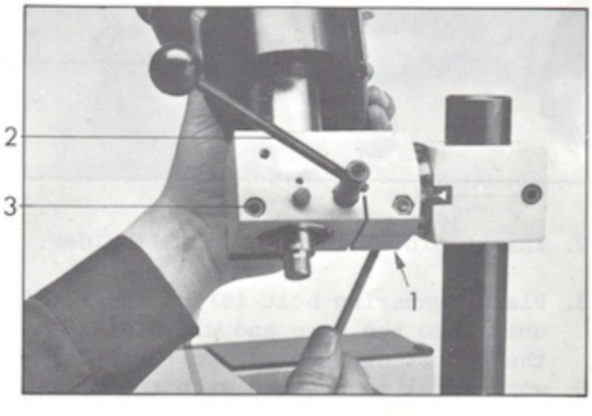
Height adjustment and turning the vertical unit



Loosen the socket head screw on the clamping head and bring the vertical unit into the required position and height.

The cross slide throat is limited to 5o mm. By clamping the vertical unit in different angles, you can match the working requirements to the cross slide travel.

Swivelling the quill holder



Loosen socket head screw (1) and swivel the quill holder to the required angle. The graduated scale enables accurate positioning.

Through these turning and swivelling movements, the quill can be set at any required angle.

Moving the quill

Insert toggle into the bore. By swivelling the toggle, the quill is lowered. A built-in spring returns the quill into the original position.

Clamping screw for the quill (3)

The quill is fixed with the socket head screw.

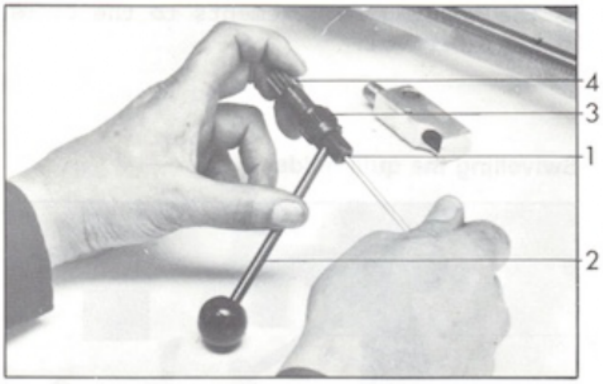
Always clamp quill when milling, never force the toggle.

The Vertical Fine Feed Attachment

The vertical fine feed serves for accurate depth adjustment for milling and drilling operations.

Mounting

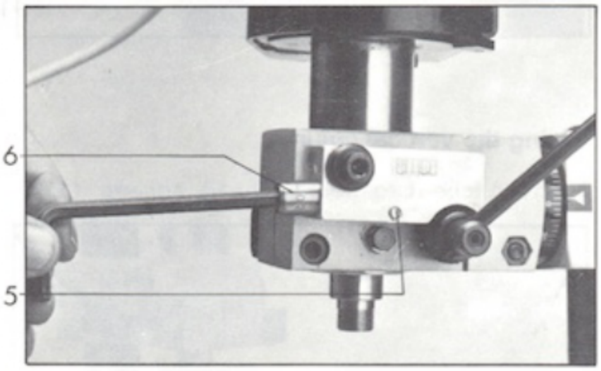
1. Loosen set screw (1), pull out toggle (2) and mount worm wheel (3) onto the pinion (4), re-tighten toggle.

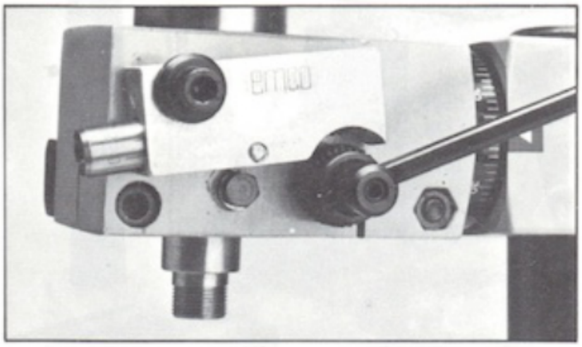


2. Insert pinion into the quill holder.
3. Place centering bolt (5) of the feed unit into the bore and clamp with the socket head screw, so that the worm wheel is engaged with the worm.

Adjusting

If the worm (6) is turned by one division, the quill moves o,1 mm.

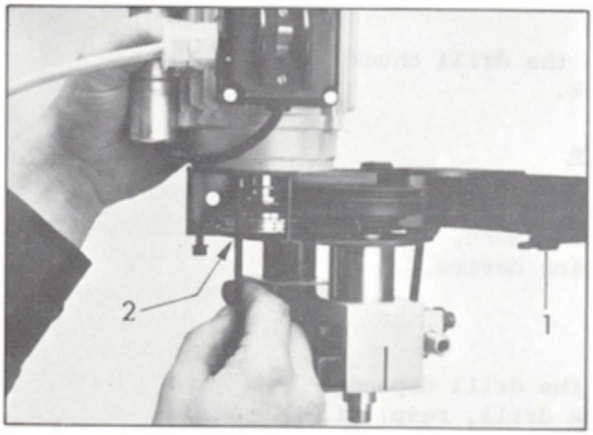




If the fine feed is not required, loosen socket head screw and swivel.

Worm and worm wheel are not engaged. The pinion can be moved with the toggle.

Adjusting the Spindle Speed



Open cover (1), loosen socket head screw (2) and swivel motor toward the front. The belt is loosened and can be shifted onto the required pulley combination. Tighten belt and fix socket head screw again.

Note:

Never work with belt cover opened!

Spindle Speed Chart

The spindle speed during milling and drilling depends on the diameter of the tool (miller, drill) and the type of workpiece material.
The values shown below are valid only for sharpened tools.

Diameter of miller or drill (mm)	SPINDLE SPEED		
	Steel	Cast Iron	Aluminium/Brass
to 5	1600	1600	1600
5-10	700	700	1600
10-15	700	380	700
15-20	380	380	700
20-40	380	380	380

Drilling in General

Clamping the drill

Drills are clamped in the drill chuck or in the collet chuck.

Clamping the workpiece

The workpiece is fixed on the top slide or on the dividing attachment, using the appropriate clamping device.

Spindle speed:

The spindle speed of the drill depends on the diameter of the drill, resp. miller and the material of the workpiece.

Drill feed:

Drill feed is achieved via the quill.

Working Tips – Drilling

The smaller the drill, the easier it is that it will break. Drill feed must be carried out with feeling (very carefully).

Coordinate drilling

With aid of the scale rings on the longitudinal and cross slide handwheels, drilling in accurate coordinates can be carried out.

Please note:

The scale on the cross slide refers to the diameter of the workpiece during turning. The scale on the cross slide handwheel indicates 2,5 mm after one complete revolution. The slide, however, moves only 1,25 mm.

Place a wooden or plastic board under the workpiece so that the milling table, machine vice, etc. are not damaged by the drill.

Use the vertical fine feed for accurate depth adjustments.

When drilling deep holes, pull the drill out of the bore regularly, so that drilling chips are removed.

A few drops of oil will decrease the friction of the drill and increase the tool's life.

Wear of the drill can first be seen edges of the main cutting surface. Re-sharpen drill in time.

Milling in General

Types of Movements

Main or working movement

The miller does the main or working movement. The cutting edges of the miller penetrate the workpiece and remove material.

Adjustments

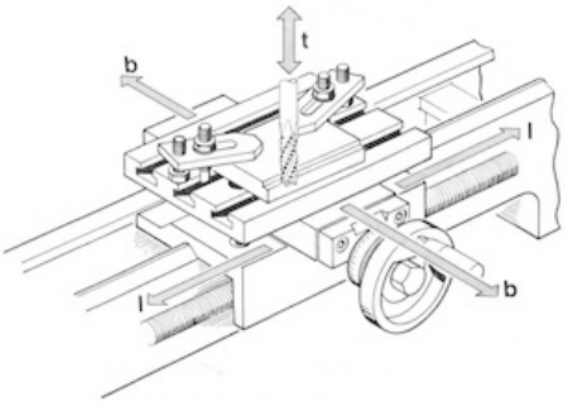
Adjustment of milling depth or width.

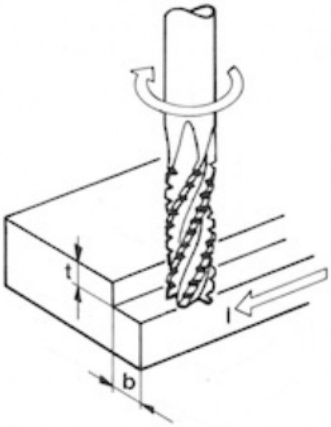
Feed movement

Accomplised by the workpiece.

Example:

- Main movement is made by miller.
- Adjustment by the cross slide (b)
- Adjustment by the quill (t)
- The feed movement by the longitudinal slide (l)

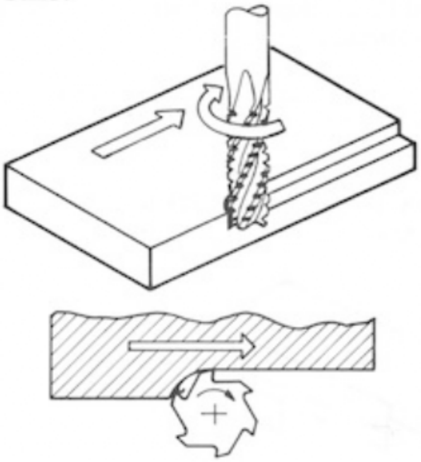




Climb Milling (downcut milling) – Conventional Milling (up-milling process)

Climb milling

Cutting direction of the miller and feed direction of the workpiece are the same.

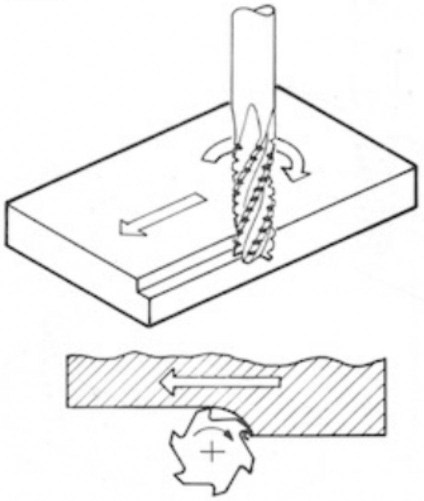


Conventional milling

Cutting direction of the miller and feed direction of the workpiece are opposite.

Working tip:

Use conventional milling method on the Compact 5, otherwise there is danger of breaking the miller.



Working Tips – Milling

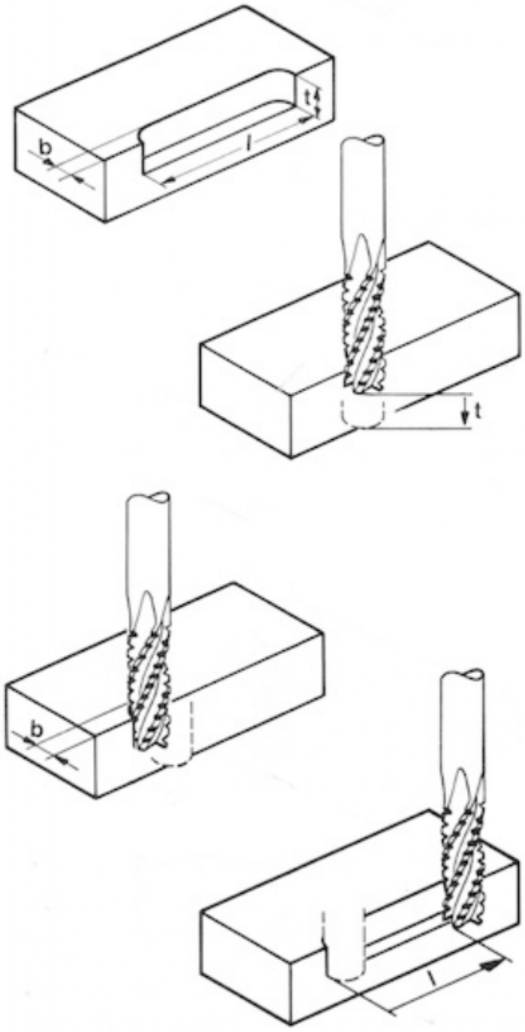
Clamping points

Tighten all clamping facilities, except that of the feed movement.

Example 1

Milling a notch with the heavy duty mill.

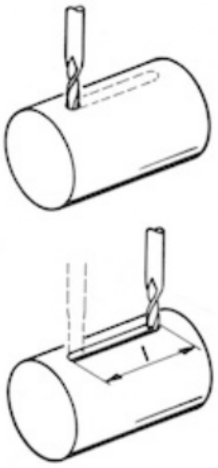
- Set milling depth "t" with the quill, clamp quill.
- Clamp longitudinal slide with cross slide feed to width "b". Clamp cross slide.
- Loosen longitudinal slide clamping, mill the length "l" of the notch.



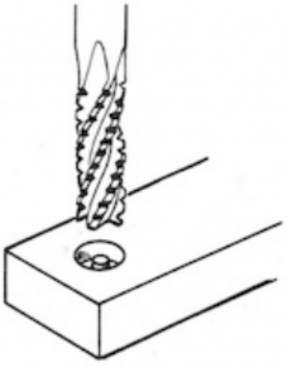
Example 2

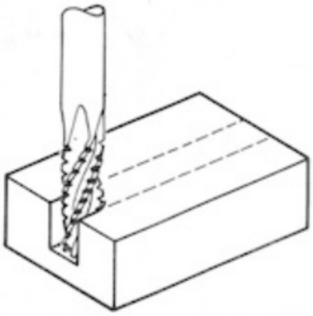
Milling a groove with the grooving cutter.

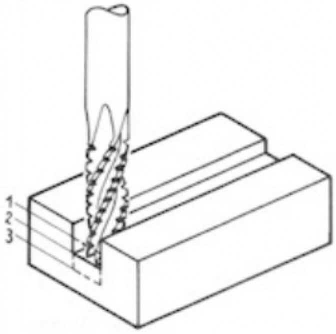
- Adjust center of axis using the cross slide, clamp cross slide.
- Using quill, mill depth of groove, clamp quill.
- Using longitudinal slide feed mill the length "l" of the groove.



The heavy duty mill has a bore on the face surface. For this reason this miller cannot be inserted in bore and then move in longitudinal or cross direction, since a plug remains in the center and prevents any feed.







Milling depth – milling feed

If the milling depth and the milling feed are too large/fast, the miller will bend - this means danger of breaking and overloading the machine. When hard materials are used, the load is larger than with softer materials.

For this reason:

Complete deep grooves in several working steps. Feed must be carried out with feeling.

Selecting the Spindle Speeds

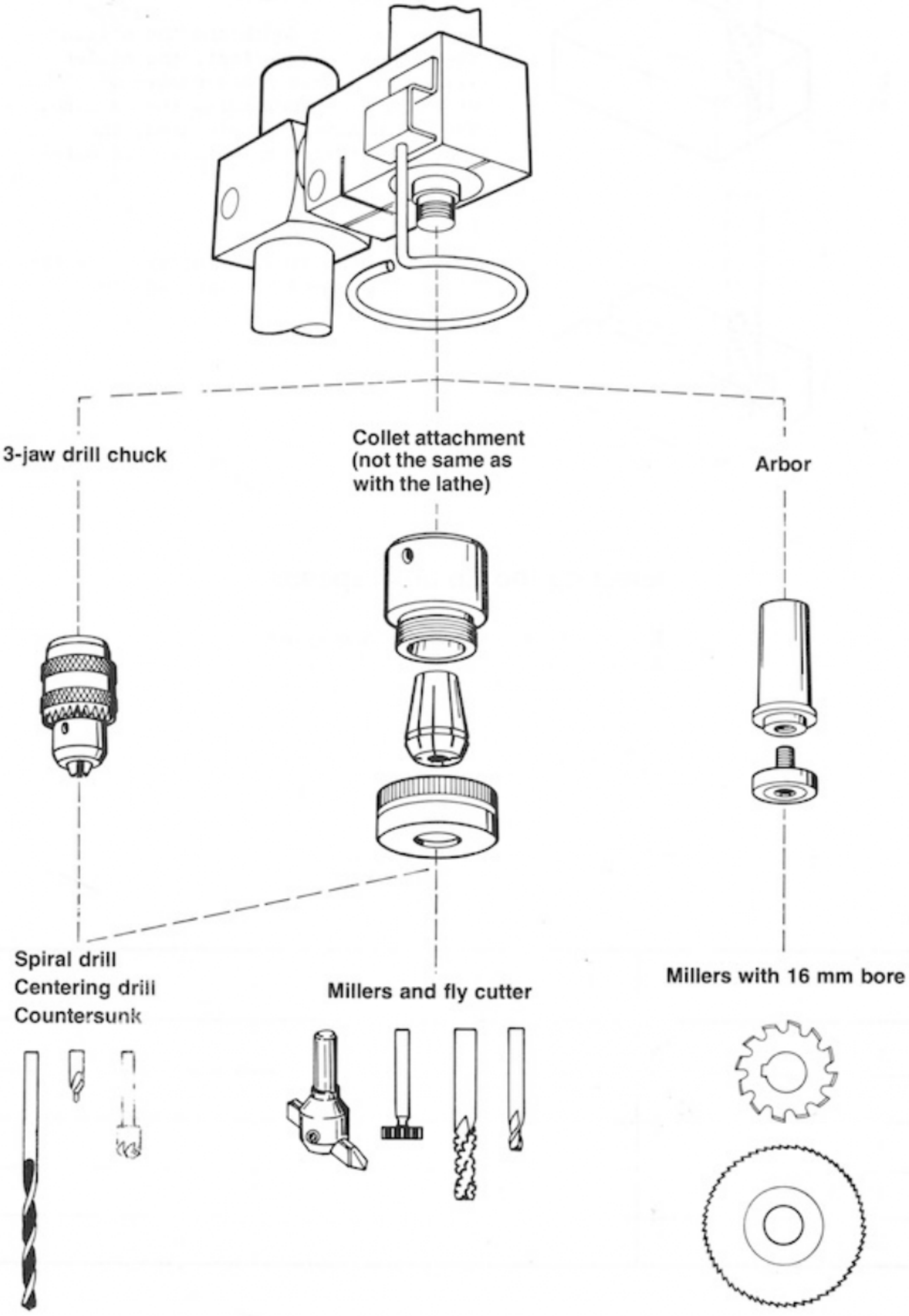
The selection of the spindle speeds depends on the diameter of the miller resp. drill and not on the size of the workpiece.

In General:

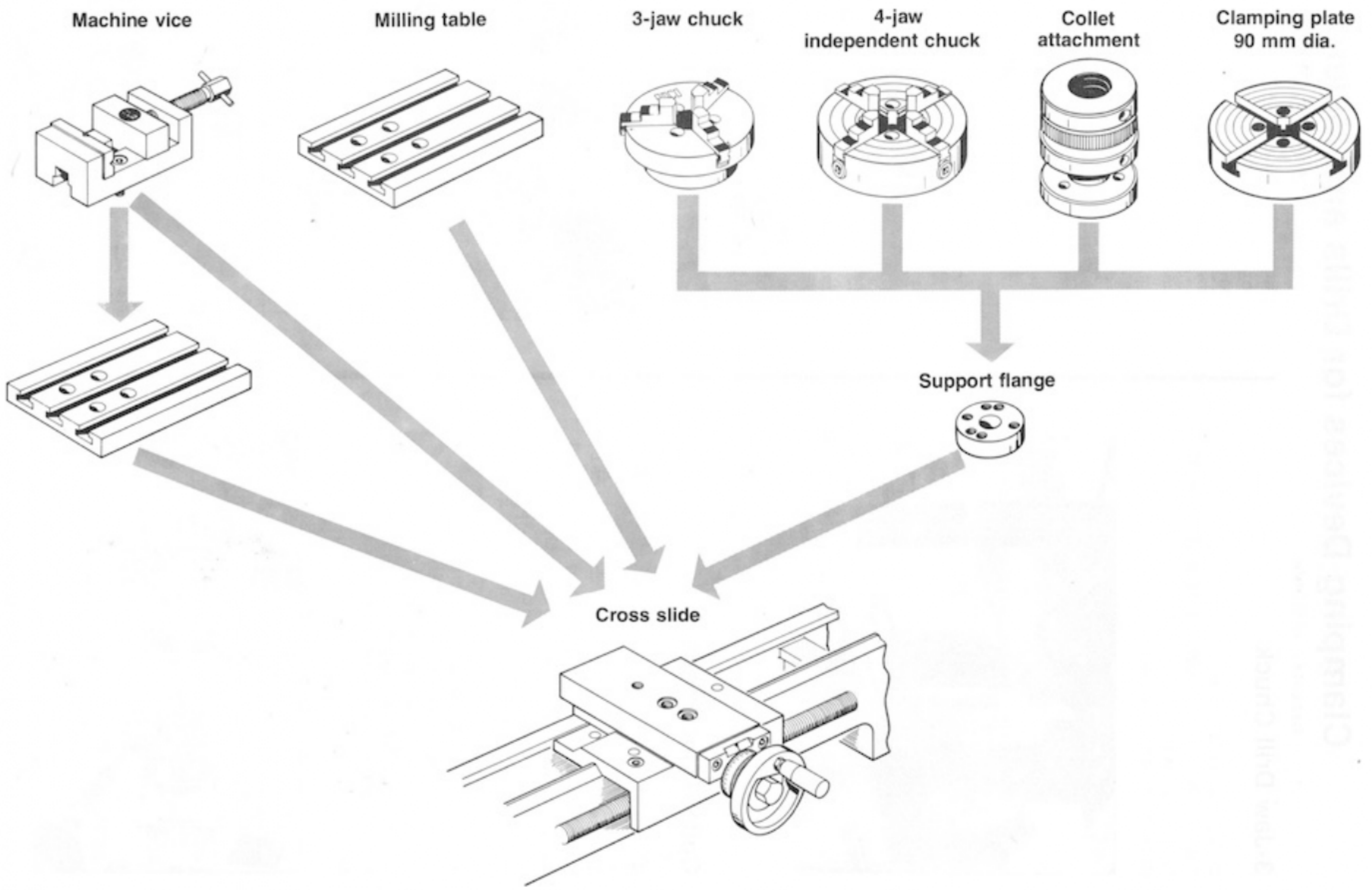
- The larger the diameter of the miller, the slower the spindle speed.
- The harder the material of the workpiece, the slower the spindle speed.

Diameter of miller or drill (mm)	SPINDLE SPEED		
	Steel	Cast Iron	Aluminium/Brass
to 5	16oo	16oo	16oo
5-1o	7oo	7oo	16oo
1o-15	7oo	38o	7oo
15-2o	38o	38o	7oo
2o-4o	38o	38o	38o

Clamping Devices for Drills and Millers (Summary)


3-jaw drill chuck
Collet attachment (not the same as with the lathe)
Arbor
Spiral drill
Centering drill
Countersunk
Millers and fly cutter
Millers with 16 mm bore

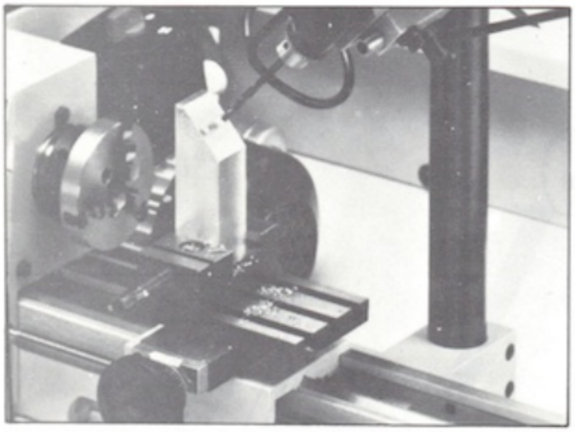
Clamping Devices for Workpieces (Summary)


Machine vice
Milling table
3-jaw chuck
4-jaw independent chuck
Collet attachment
Clamping plate 90 mm dia.
Support flange
Cross slide

Clamping Devices for Drills and Millers

3-Jaw Drill Chuck

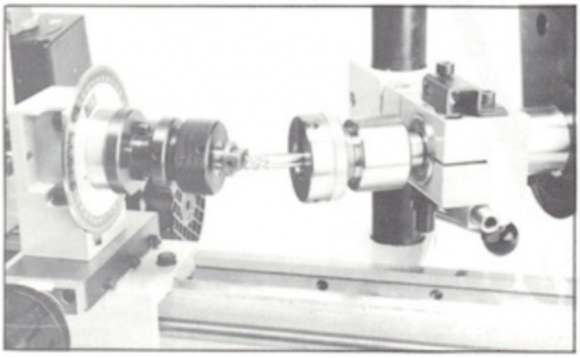
Clamping capacity: 1 - 8 mm
The 3-jaw drill chuck is identical with that used with the lathe. It is mounted directly onto the main spindle.



Collet Attachment

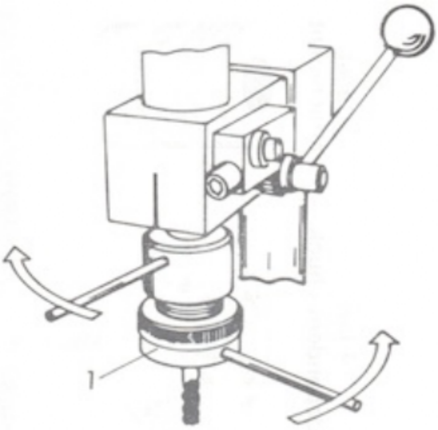
Clamping capacity using the collets ESX 25: 1,5 - 14 mm
The collet attachment for the vertical unit has an M14 x 1 mounting thread and is therefore not identical with that for the lathe. The collets for the vertical unit and the lathe are the same.

Millers must be clamped securely and with highest round-run accuracy. For this reason, the collet attachment is necessary. Clamping is accomplished by means of the pins which are included.

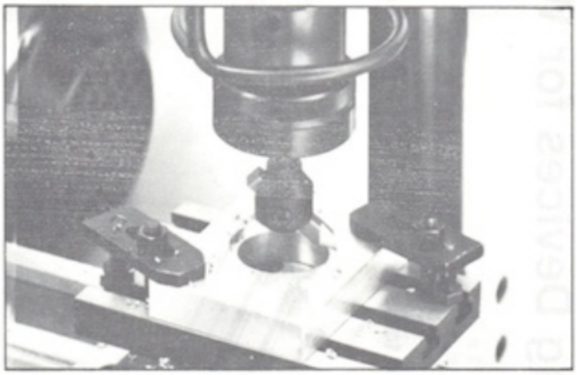


Two collet attachments being used.

Tighten clamping nut (1) clockwise!
Note: if you look at the clamping nut from the top, the tightening direction, however, looks counterclockwise.

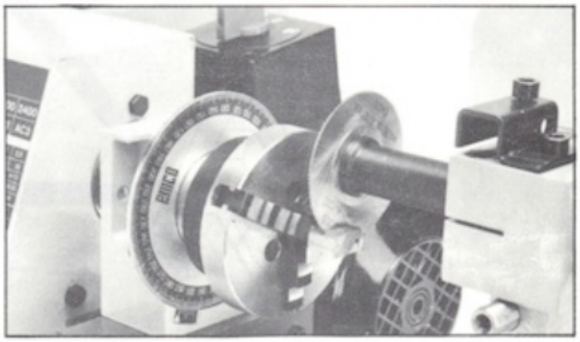


When working with the fly cutter (dia. of shaft 8 mm) secure clamping of the shaft is absolutely necessary.



Arbor

The arbor serves for clamping the gear mills, the circular saw blade and other millers with a center bore of 16 mm.



Clamping Devices for Workpieces

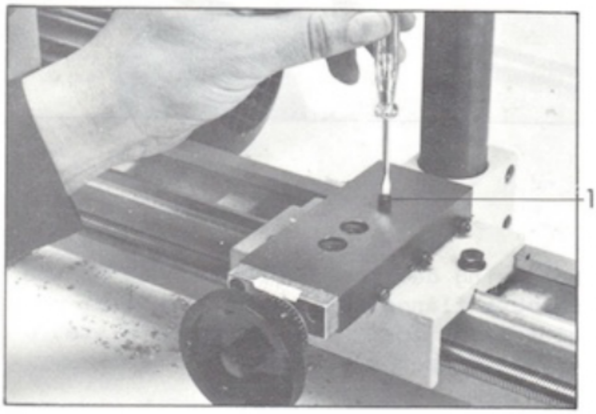
The Machine Vice

Technical data

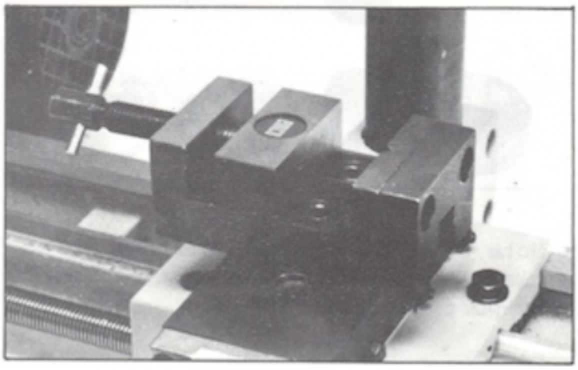
Width of clamping jaws: 46 mm
Height of clamping jaws: 18 mm
Opening of jaws: up to 32 mm

Mounting on cross slide

1. Remove set screw (1)

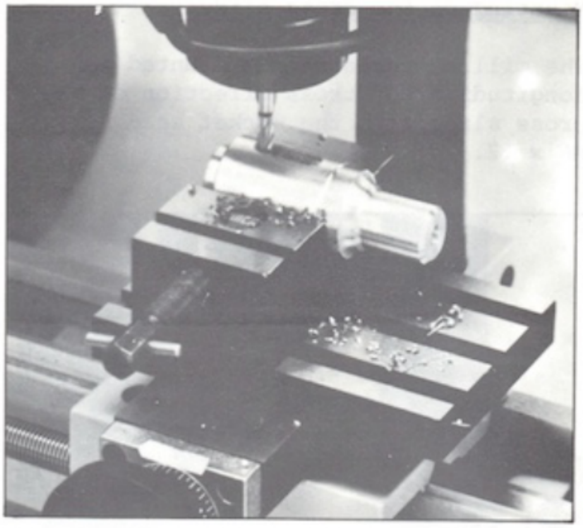


2. Mount machine vice on cross slide and tighten with the two shorter socket head screws M6 x 20.

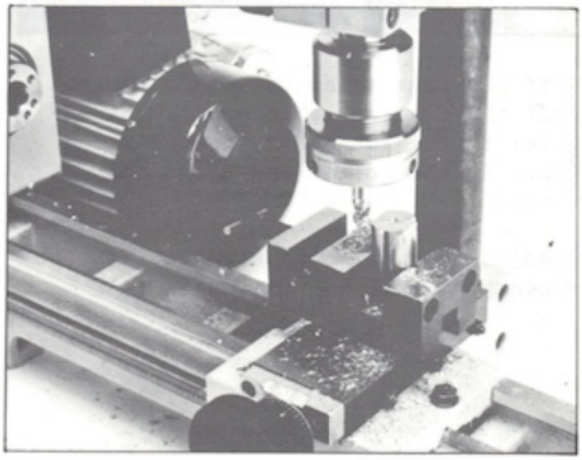


Mounting on milling table

Mount the machine vice on the milling table with the two longer socket head screws M6 x 16 and the T-nuts. The machine vice can be mounted on the milling table longitudinally or crosswise.



Working tip



The V-recess in the machine vice serves for vertically clamping round workpieces.

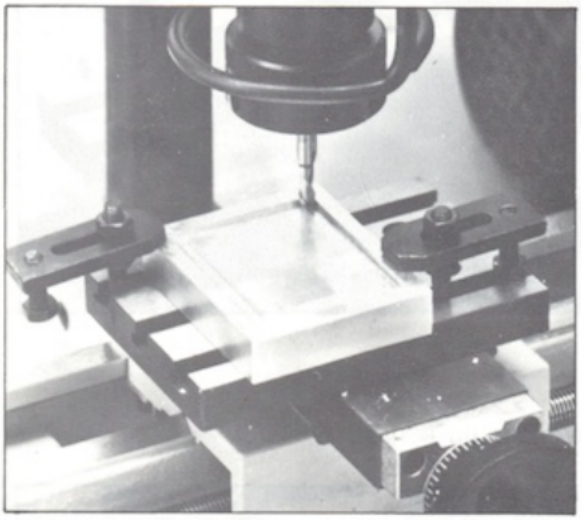
The Milling Table

Dimensions:

Length x width: 12o x 8o mm
Max. clamping height with short screws: up to 15 mm
Max. clamping height with long screws: up to 35 mm

Mounting on the cross slide:

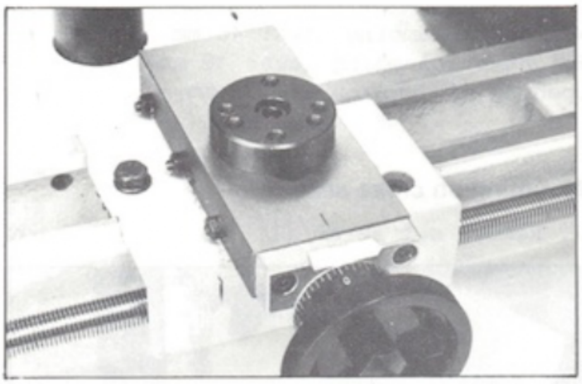
The milling table can be mounted in longitudinal or cross direction on the cross slide with the socket head screws M6 x 12.



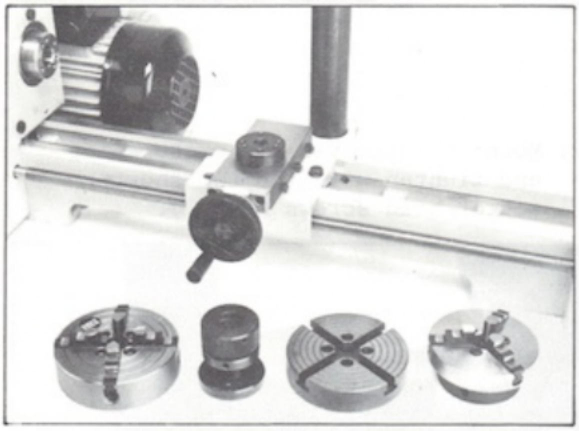
- If you want to adjust the clamping of the milling table exactly parallel to the lathe bed, feed a round pin in the collet and align the table.
- Adjust the hexagon screw so that the clamping shoe is vertical.

The Support Flange

The support flange has the same dimensions as the spindle nose of the lathe spindle. Mount the support flange on the cross slide with the socket head screw M6 x 12.



Following devices can be mounted on the support flange: 3-jaw chuck, collet attachment for lathe, clamping plate, 4-jaw independent chuck.

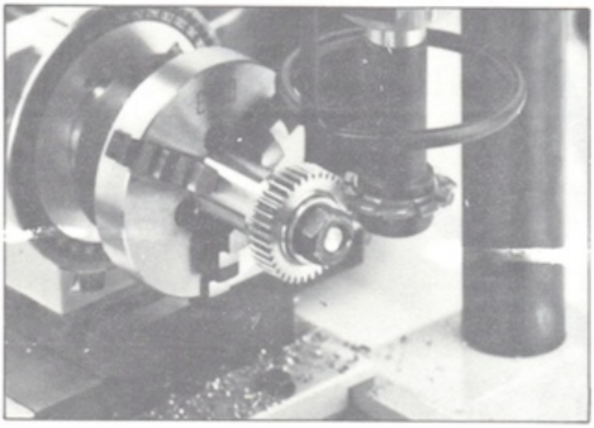


- Note that all contact surfaces are clean - cross slide-support flange, support flange-3-jaw chuck.

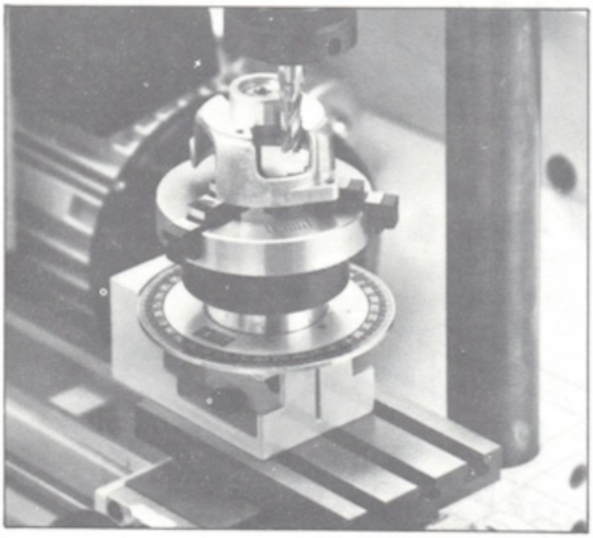
The Dividing Attachment

For drilling flange bores, for milling an exact hexagon, for milling gear wheels, etc., everywhere where exact divisions must be adjusted, a dividing attachment is required.

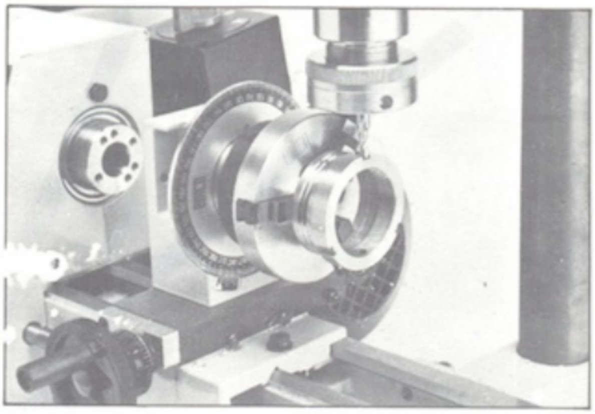
Examples:



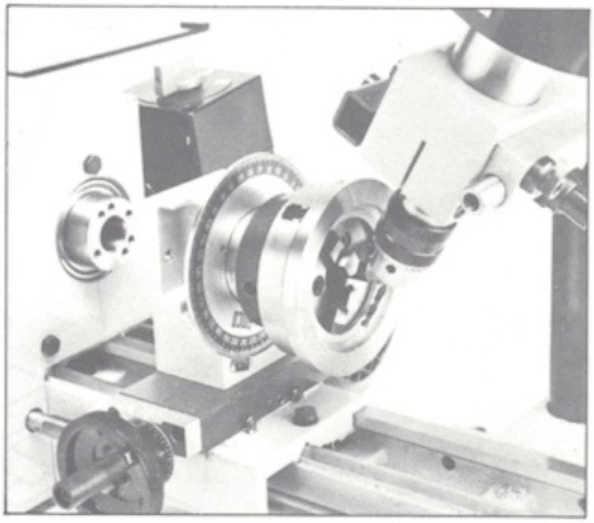
Gear milling: the preturned disc is clamped onto an årbor. The possible number of teeth of the gear wheel is engraved into the gear miller. When clamping gear millers, note revolution direction.



Workpiece is mounted on dividing attachment which is mounted horizontally. Feed is carried out with the longitudinal slide, adjustments with the cross slide.

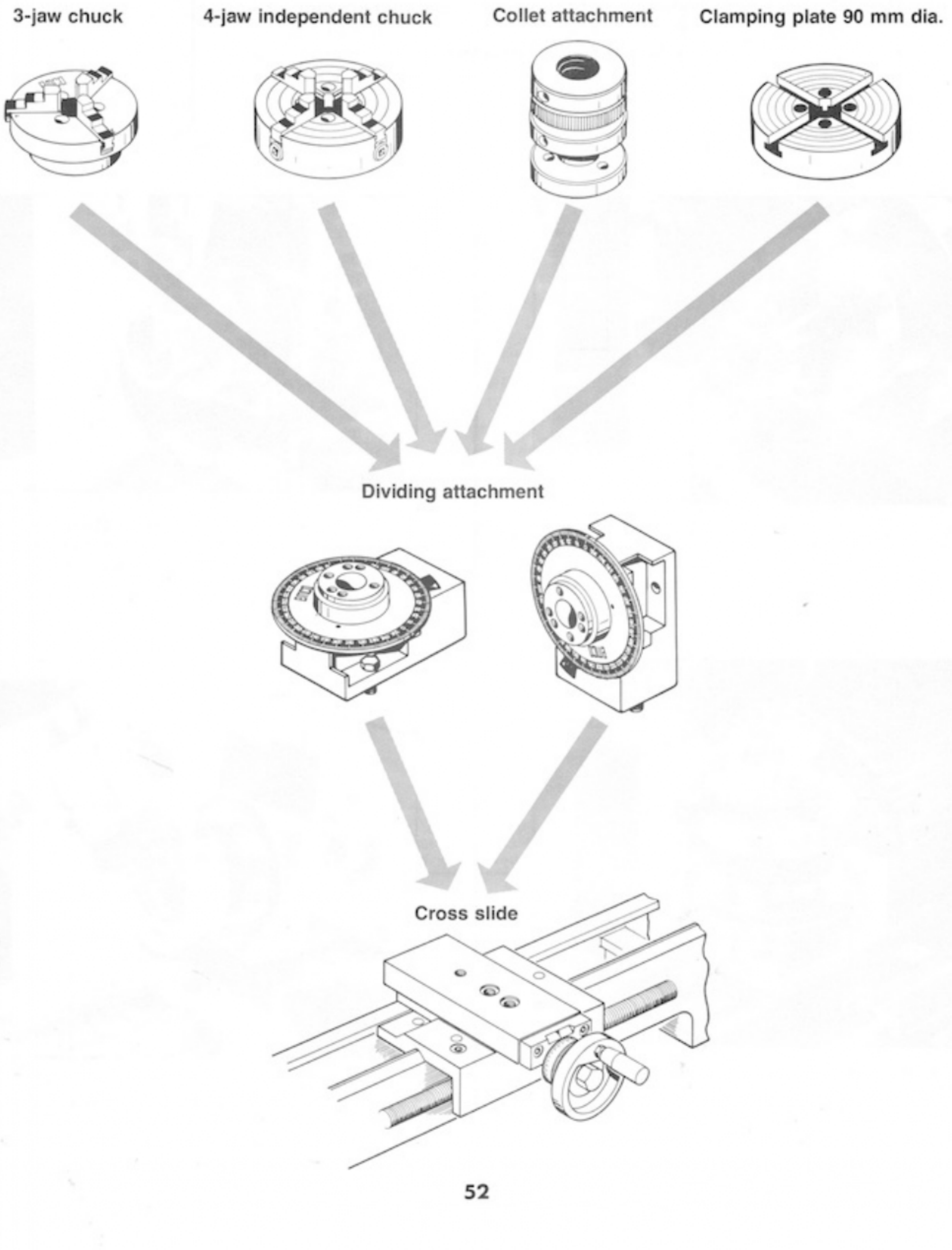


Grooves for a hooked key are milled. - The feed is carried out via the longitudinal slide, all other clamping screws (cross slide, quill, base screws, dividing attachment) are tightened.



Note: when the vertical unit is turned and swivelled, solid angles are the result.

Clamping Devices for the Dividing Attachment (Summary) (identical with Clamping Devices for Turning)

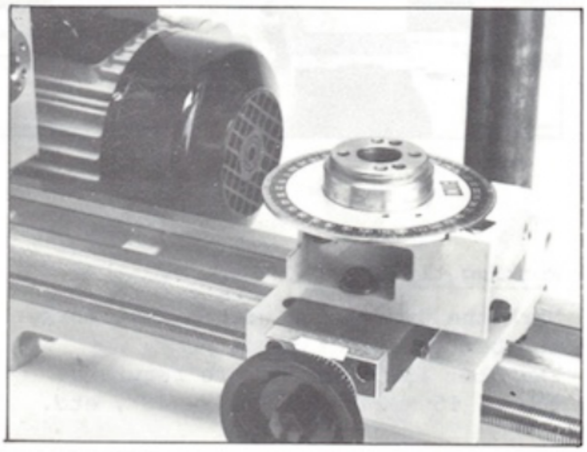

3-jaw chuck
4-jaw independent chuck
Collet attachment
Clamping plate 90 mm dia.
Dividing attachment
Cross slide

Mounting the dividing attachment

During milling operations, feed should be achieved via the longitudinal or cross slide. For this reason, the dividing attachment can be mounted either horizontally or vertically.

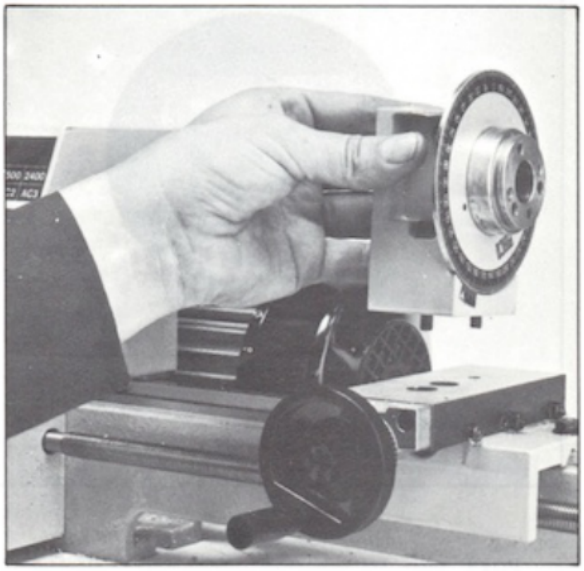
Horizontal mounting:

Mount the dividing attachment on the cross slide with the two hexagon screws M6 x 16.



Vertical mounting:

Mount dividing attachment on the cross slide with the two socket head screws M6 x 4o.



The dividing chart

The dividing chart indicates the dividing possibilities for the respective circle of holes.

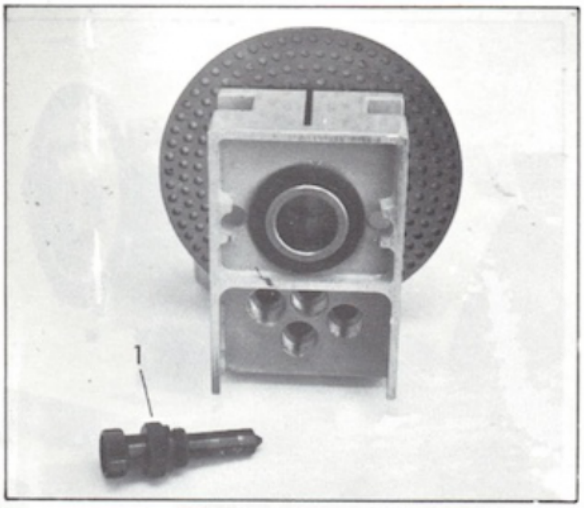
Example:

15 divisions are required. These are reached with the circle of holes 6o.
6o:15 = 4.
I.e., division in every fourth hole.

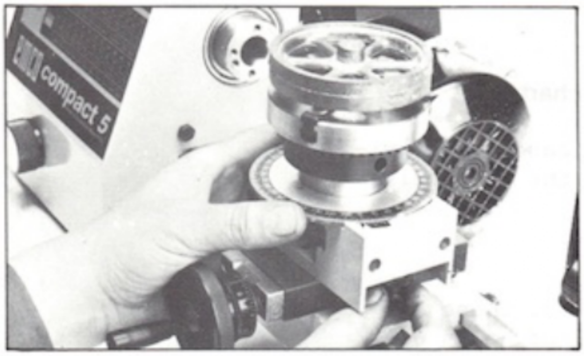
Circle of holes	Dividing possibilities																
6o	2	3	4	5	6				1o	12		15			2o	3o	6o
56	2		4			7	8				14					28	56
48	2	3	4		6		8			12			16			24	48
36	2	3	4		6			9		12				18			36

Dividing procedure

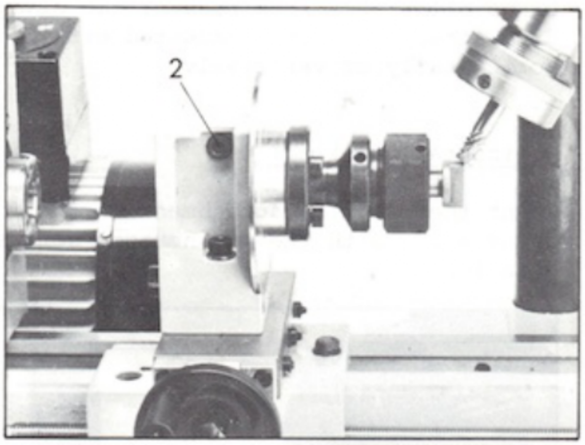
1. Insert index bolt (1) into bore for required division. The outermost circle of divisions has 6o holes, the second has 56, etc.



2. Pull the index bolt and turn dividing plate as many divisions as required.

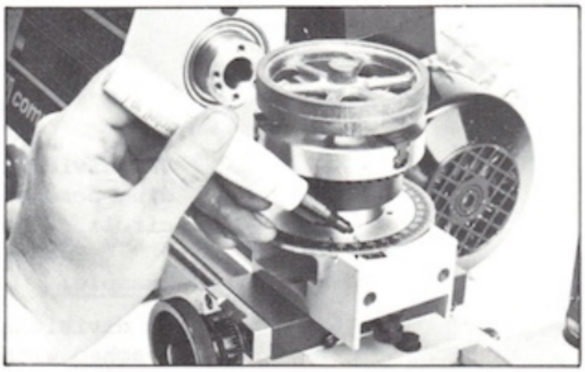


3. Tighten clamping screw (2) before each milling or drilling operation!

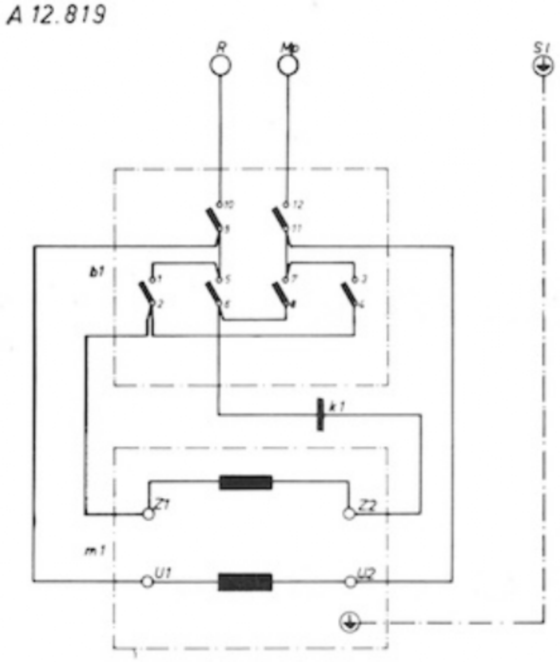


Working tip:

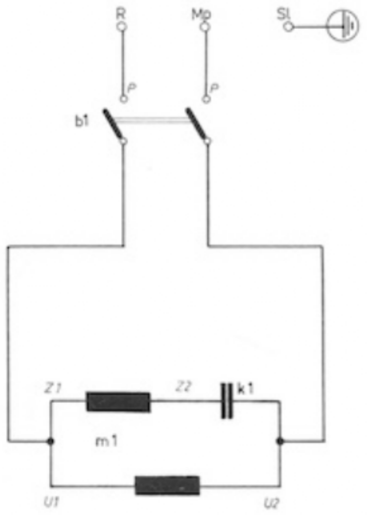
Mark the graduation with a felt marker for better orientation.
Example: 15 divisions are required.
36o° : 15 = 24°. Mark 24°, 48°, etc.



Wiring Diagram for Lathe


A 12.819
R
Mp
SI
10
12
9
11
b1
1
5
7
3
2
6
8
4
k1
Z1
Z2
m1
U1
U2

Wiring Diagram for Milling and Drilling Unit


R
Mp
SI
P
P
b1
Z1
Z2
k1
m1
U1
U2

b1	Main switch
k1	Condensor
m1	Motor

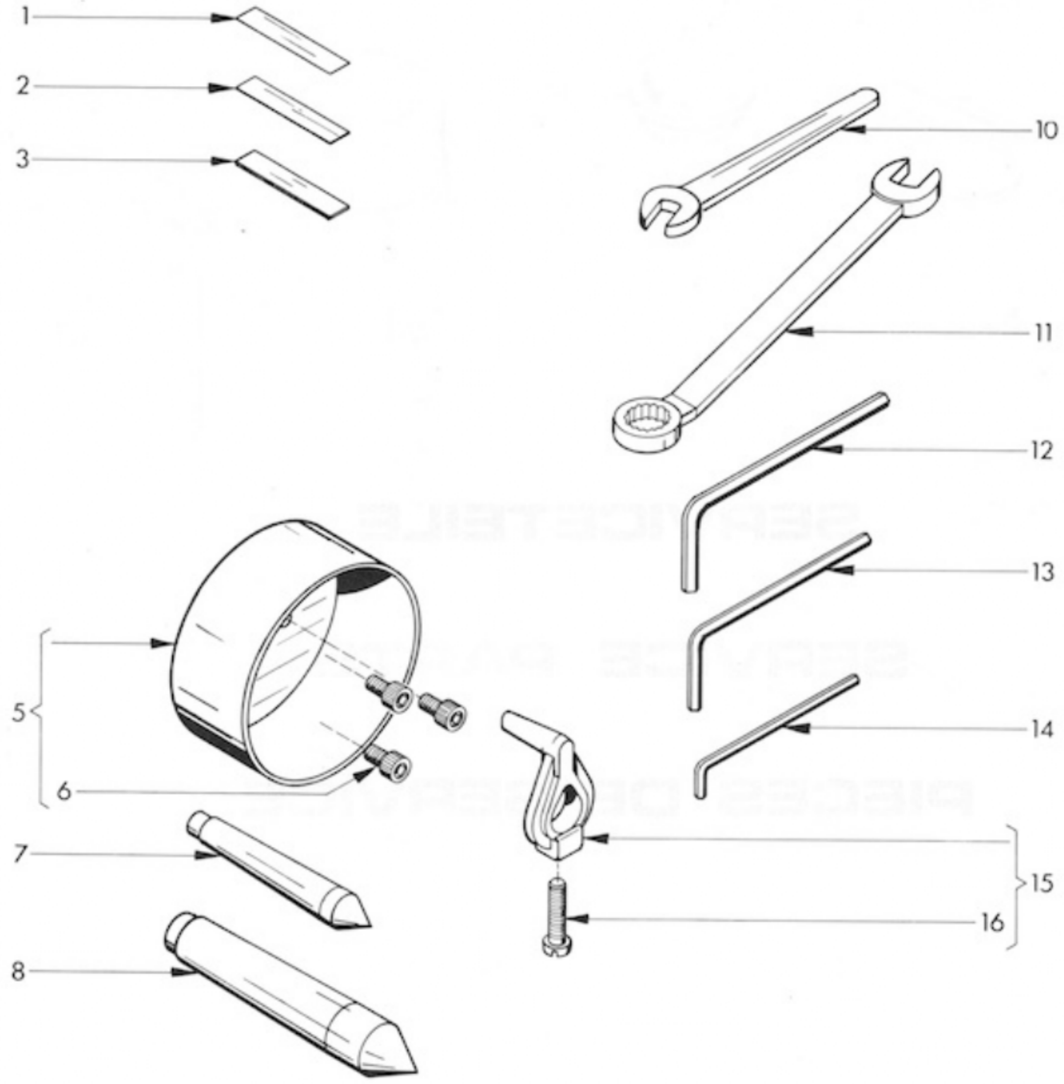
Connection Scheme
for Main Switch

b1	1 2	3 4	5 6	7 8	9 10	11 12
vorw.	–	×	×	–	×	×
–	–	–	–	–	–	–
0	–	–	–	–	–	–
–	–	–	–	–	–	–
backw.	×	–	–	×	×	×

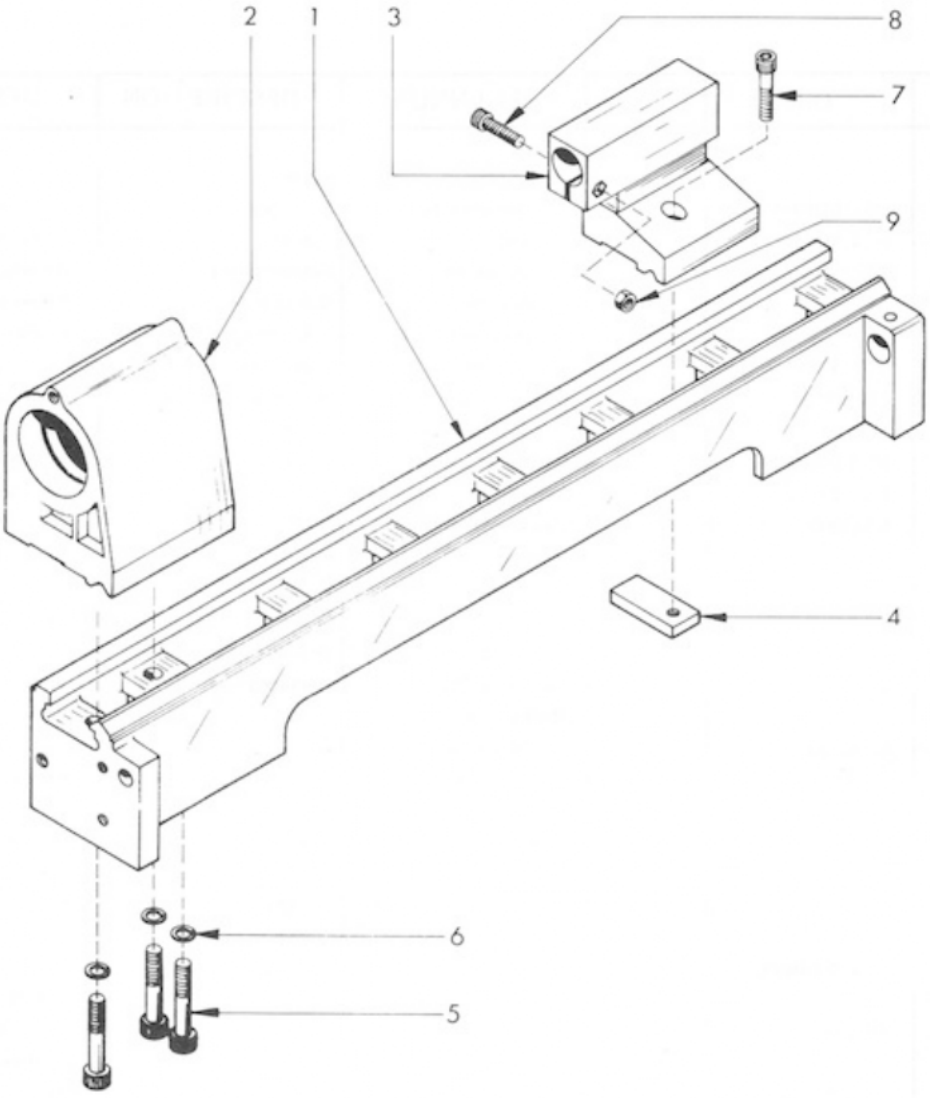
SERVICETEILE

SERVICE PARTS

PIECES DE SERVICE

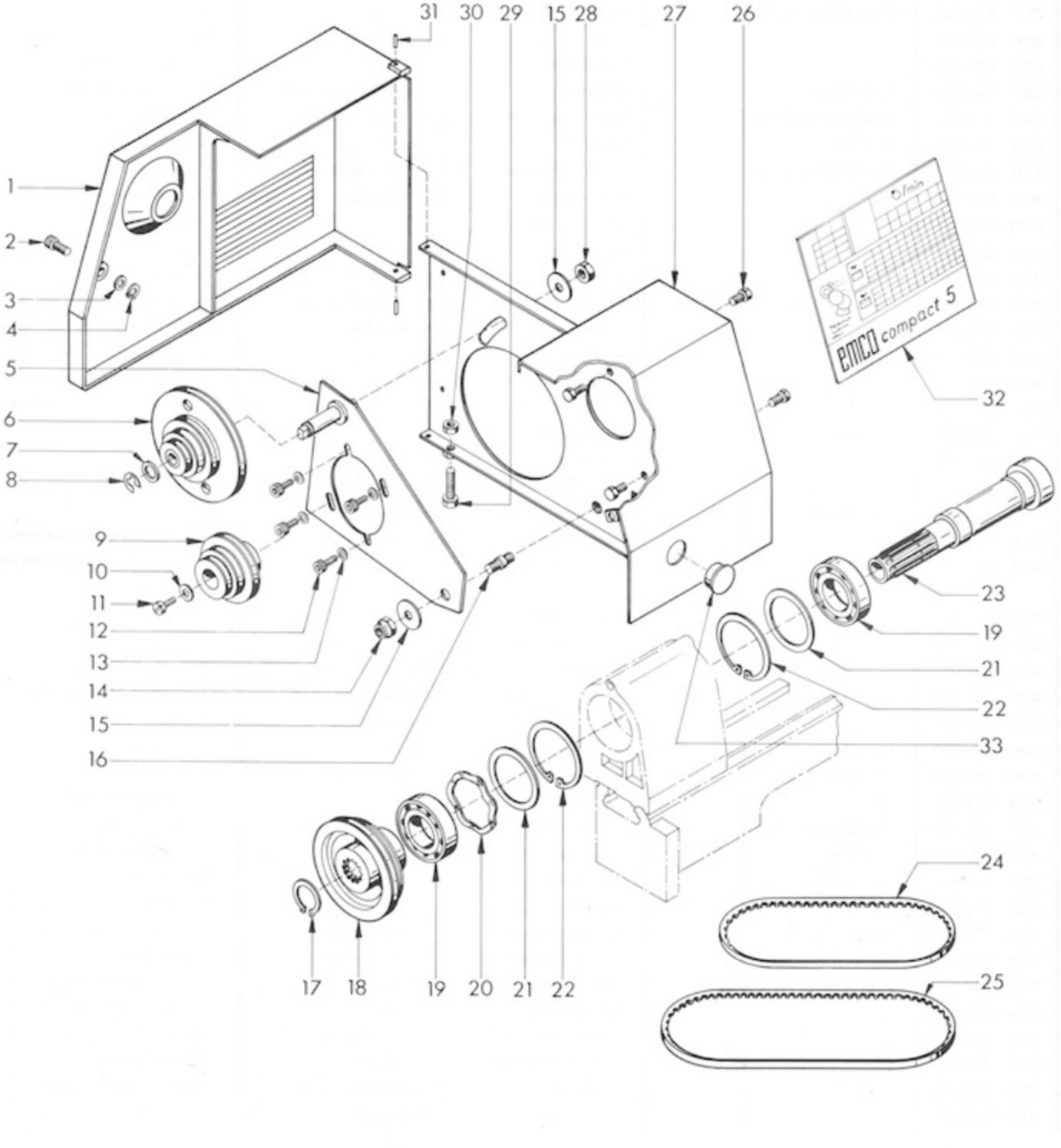


Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
				Grundausstattung	**Basic equipment**	**Equipement de base**
1	A5A 000 310			Drehstahlunterlage 0,2	Tool base 0,2	Base pour outil 0,2
2	A5A 000 320			Drehstahlunterlage 0,5	Tool base 0,5	Base pour outil 0,5
3	A5A 000 330			Drehstahlunterlage 1,0	Tool base 1,0	Base pour outil 1,0
5	A5A 070 000			Drehherzschutz	Guard for lathe dog	Protecteur pour toc de tour
6	ZSR 12 0508	M5x8 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	A5A 000 260			Körnerspitze MK1	Lathe center MT1	Contre-pointe CM1
8	B2A 000 420			Körnerspitze MK2	Lathe center MT2	Contre-pointe CM2
10	ZWZ 94 0800	SW8 DIN 894		Seinmaulschlüssel	Single-ended spanner	Clé deservice
11	B2A 000 470			Ring-Maulschlüssel	Key	Cle à oeil
12	ZWZ 11 0500	SW5 DIN 911		Schraubendreher	Hexagonal key	Clé à six pans
13	ZWZ 11 0400	SW4 DIN 911		Schraubendreher	Hexagonal key	Clé à six pans
14	A5A 000 350	SW3		Stiftschlüssel	Hexagonal key	Clé à six pans
15	A2A 080 000			Drehherz	Lathe dog	Toc de tour
16	ZSR 84 0525	M5x25 DIN 84		Zylinderschraube	Flat head screw	Vis à tête cylindrique



Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
				Bett	**Bed**	**Banc**
1	A5A 010 010			Bett	Bed	Banc
2	A5A 010 020			Spindelstock	Headstock	Poupée fixe
3	A5A 010 030			Reitstock	Tailstock housing	Corps de la poupée
4	A3A 000 040			Klemmplatte	Clamping plate	Plaque de blocage
5	ZSR 12 0845	M8x45DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
6	ZRG 28 0080	B8 DIN 127		Federring	Spring washer	Rondelle - ressort
7	ZSR 12 0630	M6x30DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZSR 12 0625	M6x25DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
9	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans

Pos	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	A5A 000 060			Räderdeckel	Cover	Couvercle
2	ZSR 12 0616	M6x16DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
3	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
4	ZRG 71 0607	6x0,7 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
5	A5A 130 000			Trägerplatte	Carrier plate	Plaque support seule
6	A5A 060 000			Vorgelegeriemenscheibe	Countershaft pulley	Poulie
7	ZSB 10 2181	SS/12x18x1,2		Stützscheibe	Supporting ring	Rondelle
8	ZSB 99 0900	(DIN 6799		Sicherungsscheibe	Retaining washer	Poulie de retenue
9	A5A 000 030			Motorriemenscheibe	Motor pulley	Poulie de moteur
10	ZSB 22 0530	B5,3 DIN 9021		Scheibe	Washer	Rondelle
11	ZSR 84 0512	M5x12 DIN84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique
12	ZSR 11 0512	M5x12 DIN6912-6.9		Zylinderschraube	Flat head screw	Vis à tête cylindrique
13	ZSB 22 0530	B5,3 DIN 9021		Scheibe	Washer	Rondelle
14	ZMU 80 0800	NM8 DIN 980-8		Sicherungsmutter	Securing nut	Ecrou de sûreté
15	ZSB 21 0840	A8,4 DIN 9021		Scheibe	Washer	Rondelle
16	A5A 000 100			Lagerbolzen	Bearing shaft	Axe palier
17	ZRG 71 2412	24x1,2 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
18	A5A 000 020			Riemenscheibe	Pulley	Poulie
19	ZLG 60 0602	6006 - 2Z		Rillenkugellager	Ball bearing	Roulement à billes
20	ZSB 02 6006	6006/K2		Ausgleichscheibe	Compensating washer	Rondelle de compensation
21	ZSB 10 5553	SS 45x55x3		Stützscheibe	Supporting ring	Rondelle
22	ZRG 72 5520	B55x2 DIN 472		Sicherungsring	Retaining ring	Anneau de retenue
23	A5A 000 010			Hauptspindel	Main spindle	Broche principale
24	ZRM 40 6335	6x335		Keilriemen	V–Belt	Courroie trapézoidale
25	ZRM 40 6450	6x450		Keilriemen	V–Belt	Courroie trapézoidale
26	ZSR 33 0612	M6x12 DIN933-5,6		Sechskantschraube	Hexagon head screw	Vis hexagonale
27	A5A 030 000			Spindelstockabdeckung	Headstock covermount	Tôle de couverture
28	ZMU 34 0800	M8 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans
29	ZSR 33 0625	M6x25 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
30	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans
31	ZST 72 0312	3x12 DIN 1472-6.8		Paßkerbstift	Grooved adjusting pin	Goupille de position
32	A5A 000 360			Frontschild 50Hz metr.	Front plate 50Hz. metr.	Plaque frontale 50 Hz. metr.
	A5B 000 360			Frontschild 60Hz zöllig	Front plate 60Hz. inch	Plaque frontale 60 Hz. en pouces
	A5D 000 360			Frontschild 50Hz zöllig	Front plate 50Hz. inch	Plaque frontale 50Hz. en pouces
	A5C 000 360			Frontschild 60Hz metr.	Front plate 60Hz. metr.	Plaque frontale 60Hz. metr.
33	ZDK 60 0019			Verschlußstopfen	Plug	Bouchon fileté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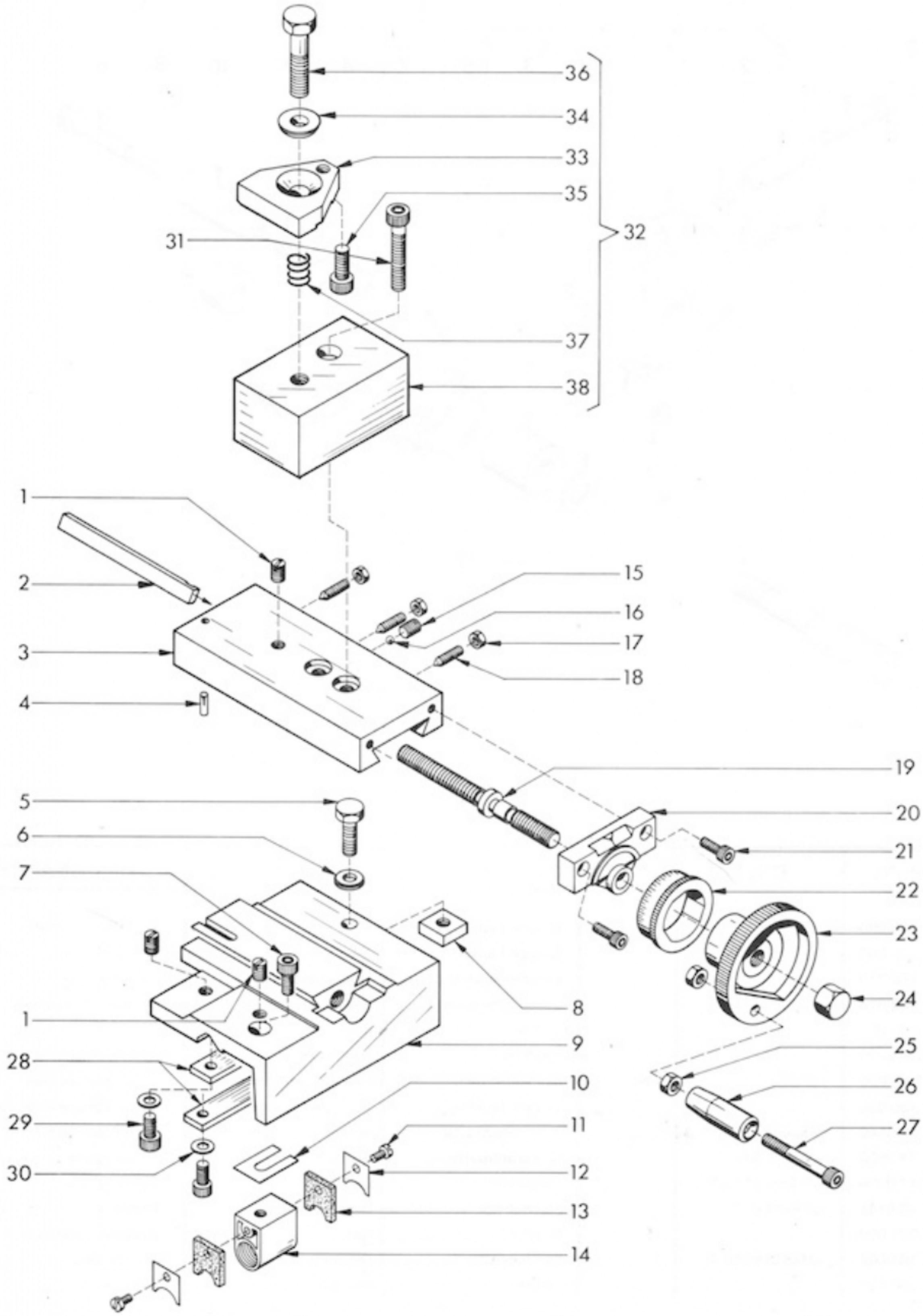
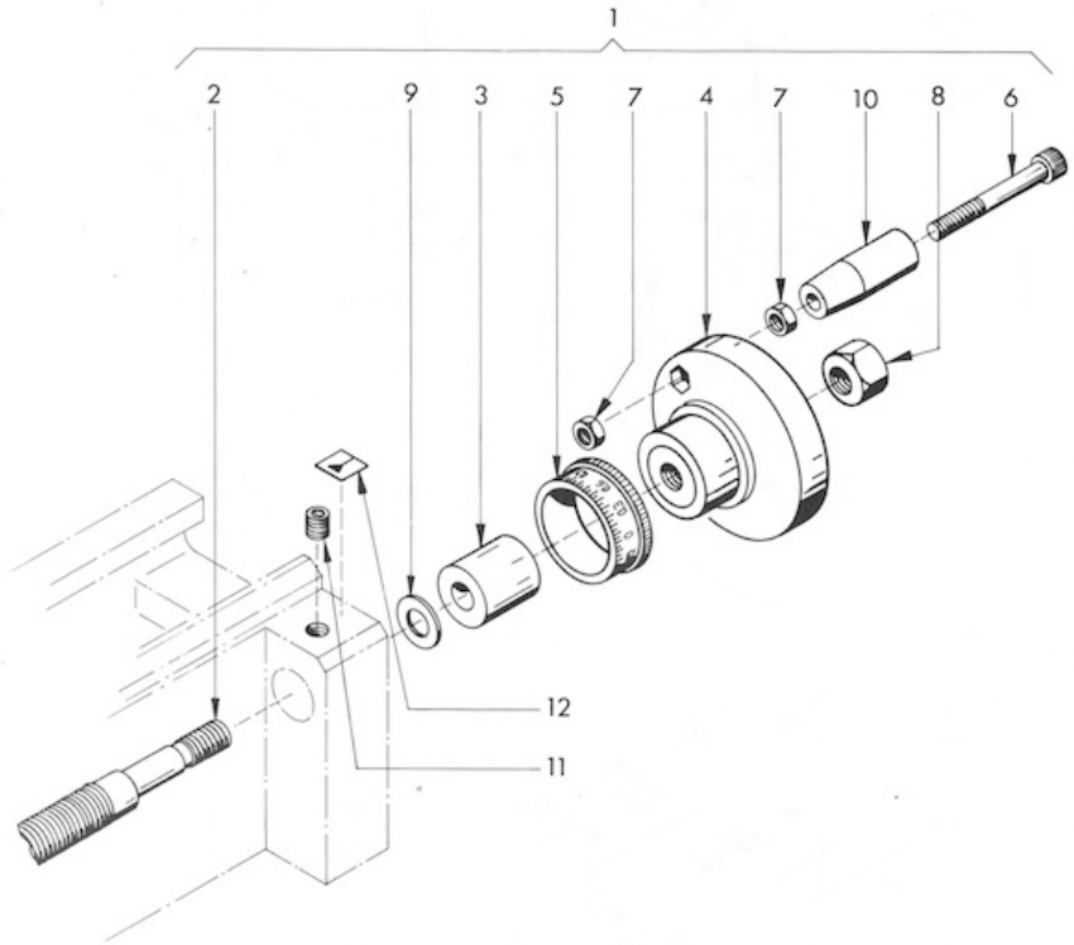
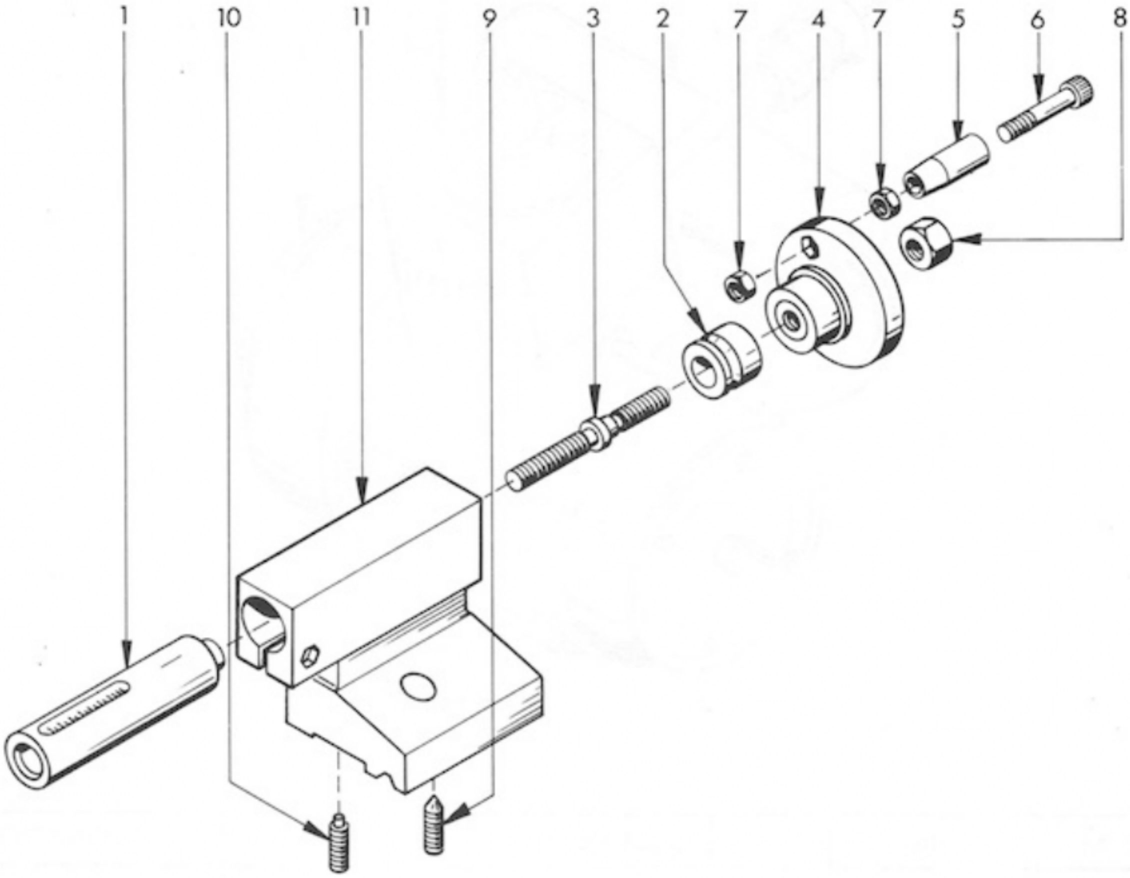
emco compact 5

Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	ZST 51 0608	M6x8 DIN551-5.8		Gewindestift	Set screw	Vis pointeau
2	A5A 020 040			Einstelleiste	Gib	Lardon
3	A5A 020 020			Querschlitten	Cross slide table	Support transversal
4	ZST 74 0310	3x10 DIN1474-6.8		Kerbstift	Grooved adjusting pin	Goupille de position
5	ZSR 33 0620	M6x20 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
6	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
7	ZSR 12 0512	M5x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	A3A 000 030			Klemmbacke	Clamping jaw	Mors de blocage
9	A5A 020 010			Schlitten metr.	Slide metr.	Support metr.
	A5B 020 010			Schlitten zöllig	Slide inch	Support en pouces
10	A5A 000 210			Abstimmscheibe	Intermediate plate	Piece intermêdiaire
11	ZSR 84 0306	M 3x6 DIN 84		Gewindeschneidschraube	Self tapping screw	Vis taraud
12	A5A 000 290			Abstreifblech	Wiper plate	Plaquettè de racleur postêrieur
13	A5A 000 280			Abstreiffilz	Felt wiper	Racleur en feutre postêrieur
14	A5A 000 090			Leitspindelmutter metr.	Lead screw nut metr.	Ecrou de vis mére metr.
	A5B 000 090			Leitspindelmutter zöllig	Lead screw nut inch	Ecrou de vis mére en pouces
15	ZST 13 0608	M6x8 DIN913-45H		Gewindestift	Set screw	Vis pointeau
16	ZKG 00 1030	GK3 DIN 5401		Stahlkugel	Steel ball	Bille en acier
17	ZMU 34 0400	M4 DIN 934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
18	ZST 53 0416	M4x16 DIN553-5.8		Gewindestift	Set screw	Vis pointeau
19	A5A 021 020			Querspindel metr.	Cross slide screw metr.	Broche transversale nue metr.
	A5B 021 020			Querspindel zöllig	Cross slide screw inch	Broche transversale nue en pouces
20	A5A 021 010			Querspindelträger	Lead screw mount	Palier de la broche
21	ZSR 12 0412	M4x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
22	A5A 021 040			Skalenring metr.	Graduatet ring metr.	Bague graduee metr.
	A5B 021 040			Skalenring zöllig	Graduatet ring inch	Bague graduée en pouces
23	A5A 022 000			Handrad	Handwheel	Volant
24	ZMU 17 0800	M8 DIN917-5.8		Hutmutter	Cap nut	Ecrou borgne
25	ZMU 34 0500	M5 DIN 934		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
26	A5A 021 050			Kegelgriff	Handle	Bouton cylindrique
27	ZSR 12 0540	M5x40 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
28	A5A 000 130			Bettleiste	Keep plate	Lardon longitudinal
29	ZSR 12 0510	M5x10 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
30	ZSB 25 0530	B5,3 DIN 125		Scheibe	Washer	Rondelle
31	ZSR 12 0635	M6x35 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
32	A5A 080 000			Gruppe Stahlauflage	Toolholder compl.	Ens. Porte outil
33	A5A 050 070			Spannklaue	Tool clamp	Bride de serrage de l'outil
34	B4A 050 120			Ballenscheibe	Washer	Rondelle spherique
35	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
36	ZSR 31 0835	M8x35 DIN931-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
37	ZFD 20 4152			Druckfeder	Compression spring	Ressort de compression
38	A5A 080 010			Stahlauflage	Toolholder	Porte outil

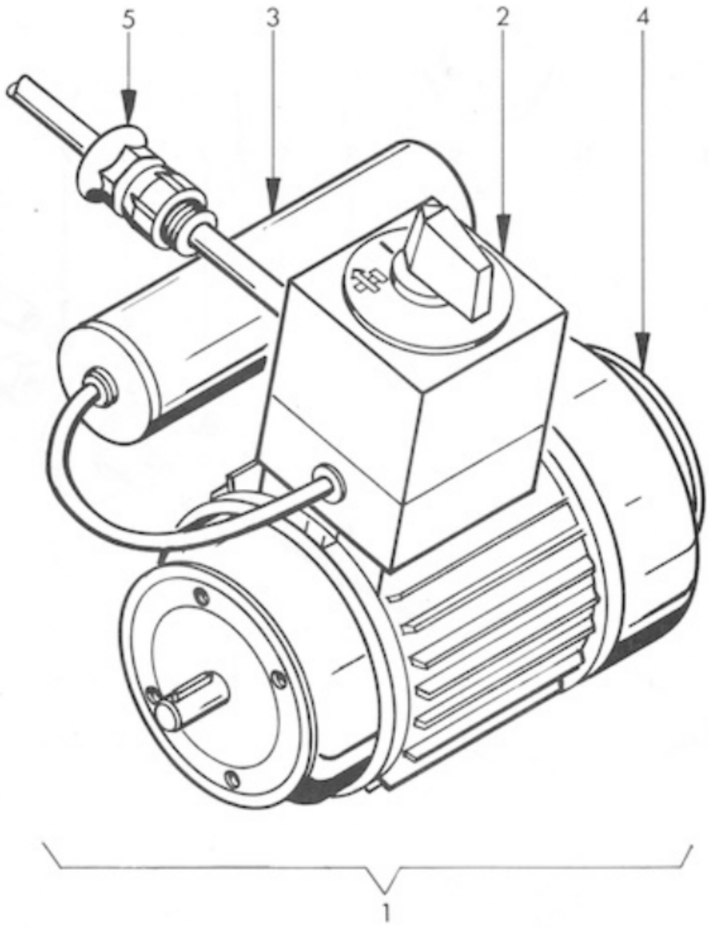




Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	A5A 160 000			Gruppe Leitspindel metr.	Lead screw metr. compl.	Ens. Vis mére metr.
	A5B 160 000			Gruppe Leitspindel zöll.	Lead screw inch compl.	Ens. Vis mére en pouces
2	A5A 160 010			Leitspindel metr.	Lead screw mwtr.	Vis mére metr.
	A5B 160 010			Leitspindel zöllig	Lead screw inch	Vis mére en pouces
3	A5A 160 050			Büchse	Bush	Douille
4	A5A 022 000			Handrad	Handwheel	Volant
5	A5A 160 030			Skalenring metr.	Graduated ring metr.	Bague graduée metr.
	A5B 160 030			Skalenring zöllig	Graduated ring inch	Bague graduée en pouces
6	ZSR 12 0540	M5x40 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZMU 34 0500	M5 DIN 934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
8	ZMU 17 0800	M8 DIN 917-5.8		Hutmutter	Cap nut	Ecrou borgne
9	ZSB 10 8141	SS 8x14x1,2		Stützscheibe	Supporting ring	Rondelle
10	A5A 021 050			Kegelgriff	Handle	Bouton cylindrique
11	ZST 16 0608	M6x8 DIN916/45H		Gewindestift	Set screw	Vis pointeau
12	H8A 000 120			Zeiger	Pointer	Aiguille

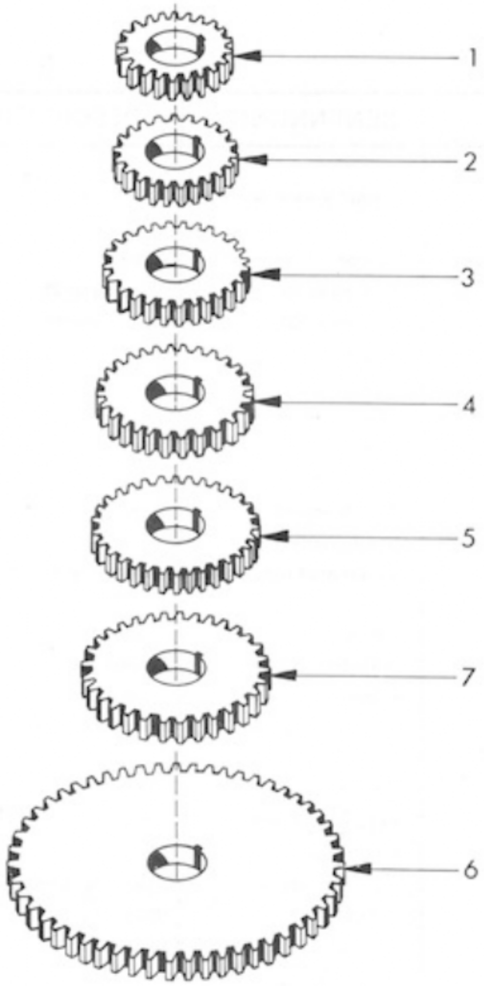


Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
				Reitstockpinole	**Tailstock barret**	**Canon de la poupée**
1	A5A 121 000			Pinole metr.	Barret metr.	Canon metr.
	A5B 121 000			Pinole zöllig	Barret inch	Canon en pouces
2	A5A 120 020			Lagerbüchse	Bearing bush	Coussinet
3	A5A 120 030			Triebschraube	Lead screw	Broche
4	A5A 022 000			Handrad	Hand wheel	Volant
5	A5A 021 050			Kegelgriff	Handle	Bouton cylindrique
6	ZSR 12 0540	M5x40DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZMU 34 0500	M5 DIN934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
8	ZMU 17 0800	M8DIN917-5.8		Hutmutter	Cap nut	Ecrou borgne
9	ZST 14 0620	M6x20DIN914-45H		Gewindestift	Set screw	Vis pointeau
10	ZST 15 0620	M6x20DIN915-45H		Gewindestift	Set screw	Vis pointeau
11	A5A 010 030			Reitstock	Tailstock housing	Corps de la poupée



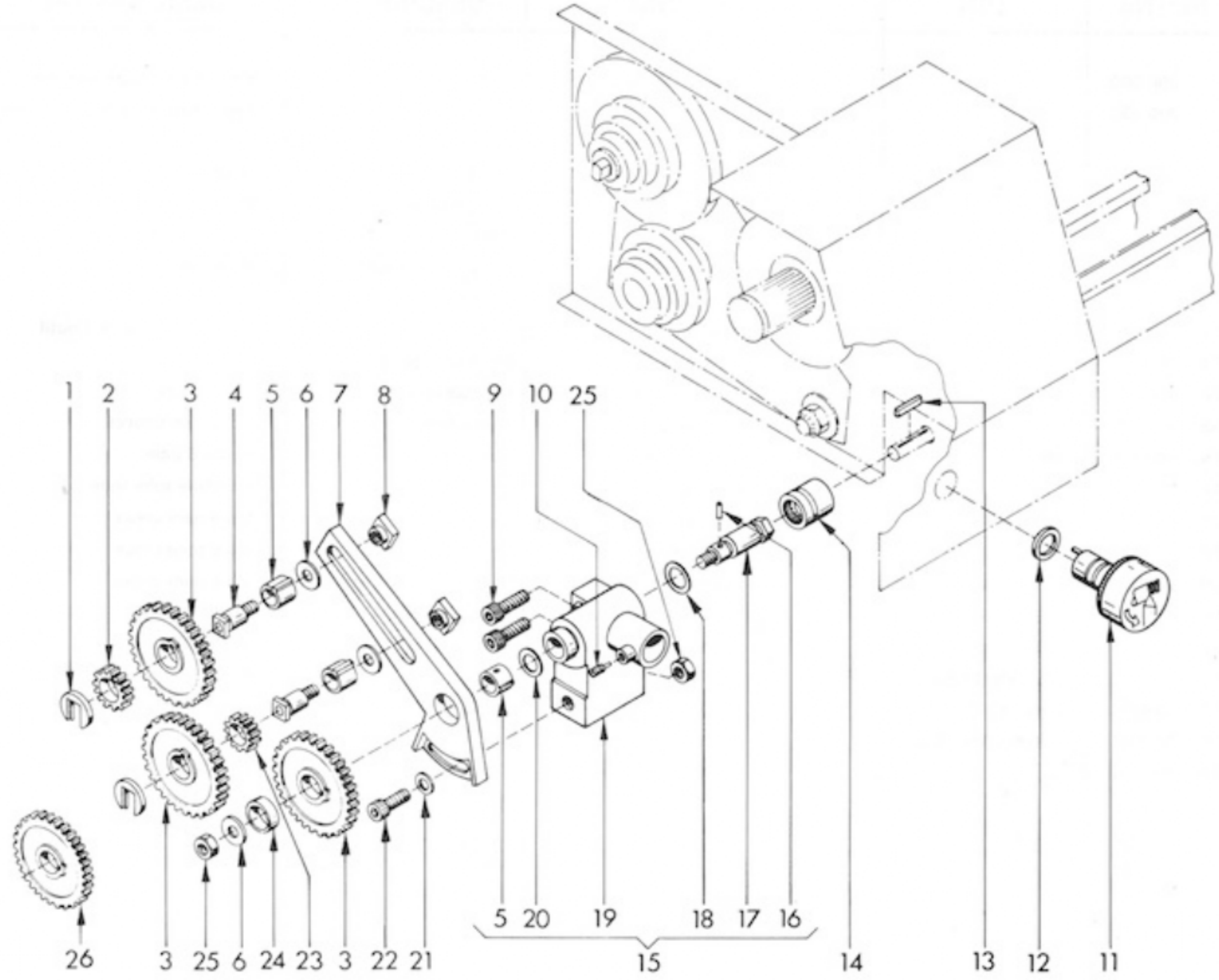
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	A5 . .. .*			Gruppe E- Ausrüstung	Electrical equipment compl	Ens. Electrique equipement
2	ZME .. ....*			Schalter	Switch	Interrupteur
3	ZME .. ....*			Kondensator	Condenser	Condensateur
4	ZME 20 0043			Lüfterhaube	Fan cover	Carter de ventilateur
5	ZPG 10 0007	MZB 11		Kabelverschraubung	Screw-type conduit fitting	Raccordement à vis

Spannung Voltage (V) Tension	Frequenz Frequency Frequence	Ref. Nr. für Gr. E–Ausrüstung Ref. Nr. for electrical equipment compl. Ref. Nr. pour ens. electrique equipement	Ref. Nr. für Kondensator Ref. Nr. for condenser Ref. Nr. pour condensateur	Ref. Nr. für Schalter Ref. Nr. for switch Ref. Nr. pour interrupteur
115	60	A5B 100 000	ZME 20 0069	ZME 20 0065
115	60 CSA	A5C 100 000	ZME 20 0069	ZME 20 0066
100	50	A5D 100 000	ZME 20 0070	ZME 20 0065
100	60	A5E 100 000	ZME 20 0070	ZME 20 0065
110	50	A5F 100 000	ZME 20 0069	ZME 20 0065
220	60	A5G 100 000	ZME 20 0068	ZME 20 0065
230	50	A5H 100 000	ZME 20 0068	ZME 20 0065
240	50	A5L 100 000	ZME 20 0067	ZME 20 0065
250	50	A5M 100 000	ZME 20 0067	ZME 20 0065
220	50 VDE	A5V 100 000	ZME 20 0068	ZME 20 0065
220	50	A5U 100 000	ZME 20 0068	ZME 20 0065

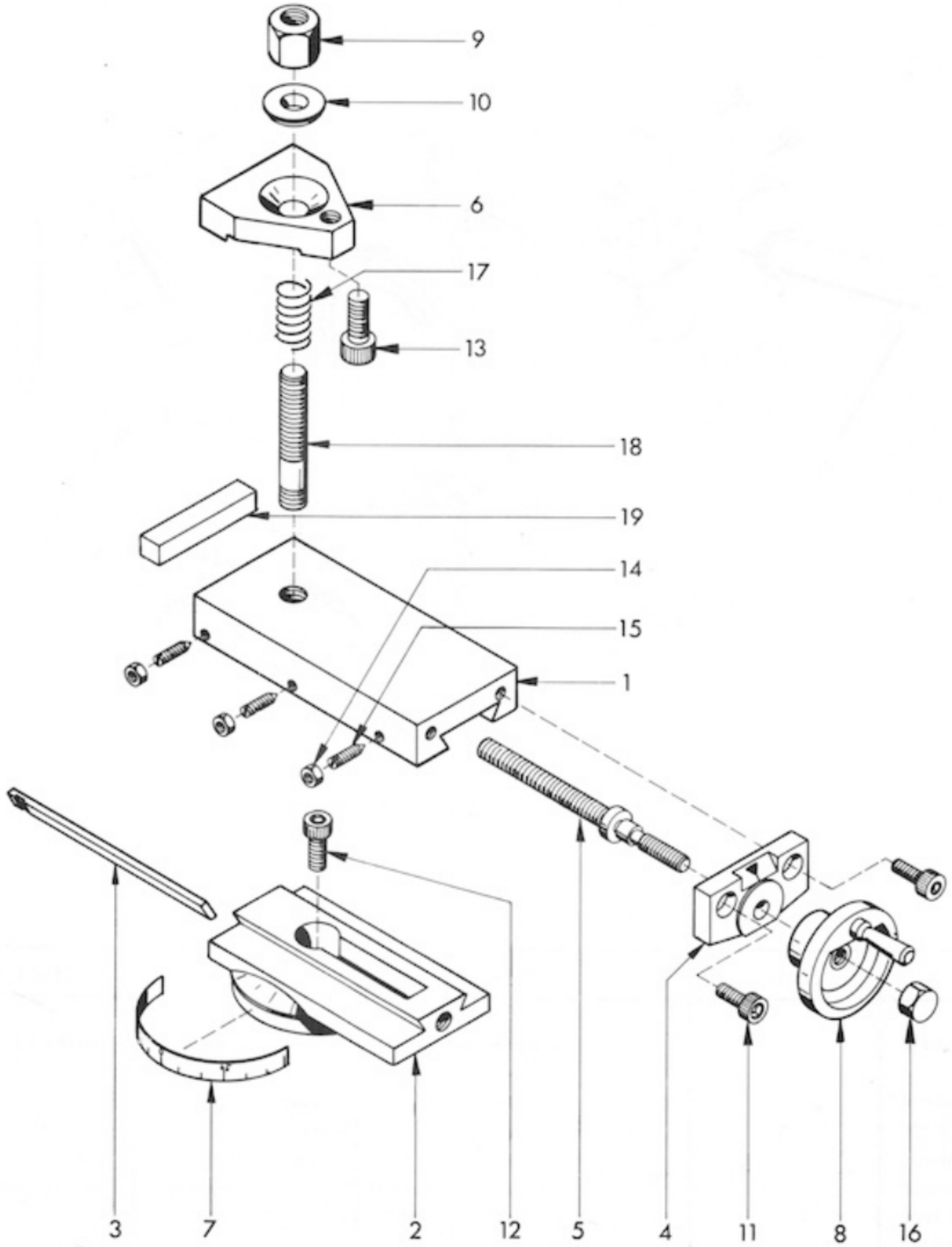


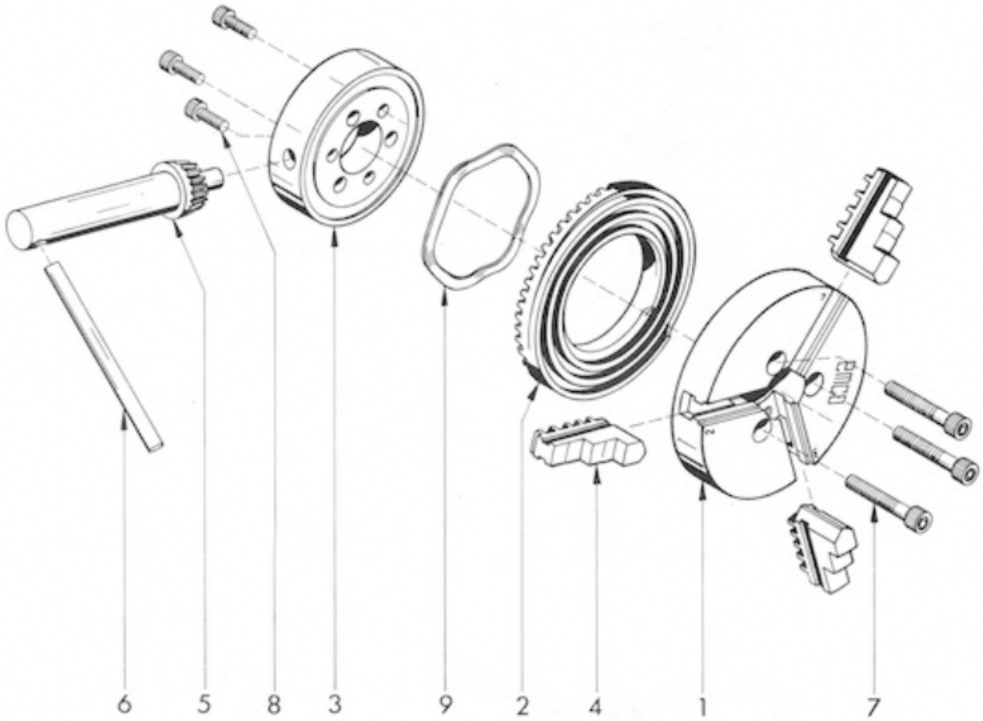
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 200			**Gruppe Rädersatz**	**Set of change gears**	**Jeu d'engrenages**
1	A5Z 200 010			Wechselrad 26	Change gear 26	Engrenage 26
2	A5Z 200 020			Wechselrad 30	Change gear 30	Engrenage 30
3	A5Z 200 030			Wechselrad 34	Change gear 34	Engrenage 34
4	A5Z 200 040			Wechselrad 35	Change gear 35	Engrenage 35
5	A5Z 200 050			Wechselrad 36	Change gear 36	Engrenage 36
6	A5Z 200 060			Wechselrad 72	Change gear 72	Engrenage 72
7	A5Z 200 070			Wechselrad 40	Change gear 40	Engrenage 40

Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 300			**Gruppe Vorschubgetriebe**	**Feed mechanism**	**Mecanisme d'avance**
1	B1A 000 040			Scheibe	Washer	Rondelle
2	A5A 000 180			Wechselrad 25	Change gear 25	Engrenage 25
3	A5A 000 170			Wechselrad 60	Change gear 60	Engrenage 60
4	A5A 000 150			Scherbolzen	Shaft	Boulon-axe
5	A5A 000 240			Keilhülse	Bush	Douille-clavette
6	B2A 071 020			Scheibe 16	Washer 16	Rondelle 16
7	A5A 000 080			Räderschere	Quadrant	Lyre
8	B2A 071 040			Nutenstein	T–nut	Boulon tête carrée
9	ZSR 12 0622	M6x22 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
10	ZST 17 0410	M4x10 DIN417-5.8		Gewindestift	Set screw	Vis pointeau
11	A5A 150 000			Schaltknopf mit 0-Ring	Control knob with 0-ring	Bouton de commande avec bague-0
12	ZOR 01 1324			0-Ring	0-ring	Bague-0
13	ZFD 85 3320	A3x3x20 DIN6885		Paßfeder	Parallel key	Clavette parallèle
14	A5A 000 140			Kupplung	Coupling	Embrayage
15	A5A 140 000			Gruppe Kupplungsgehäuse	Coupling compl.	Ens. Embrayage
16	A5A 140 040			Scherstift	Shear pin	Goupille de cisaillement
17	A5A 140 020			Kupplungsbolzen	Coupling bolt	Boulon d'embrayage
18	ZSB 12 1203	PS 12x18x0,3		Paßscheibe	Shim ring	Rondelle
19	A5A 140 010			Kupplungsgehäuse	Clutch housing	Cage d'embrayage
20	ZSB 12 1003	PS 10x16x0,3		Paßscheibe	Shim ring	Rondelle
21	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
22	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
23	A5A 000 190			Wechselrad 20	Change gear 20	Engrenage 20
24	A5A 000 160			Zwischenhülse	Spacer	Douille d'écartement
25	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
26	A5A 000 300			Wechselrad 50	Change gear 50	Engrenage 50

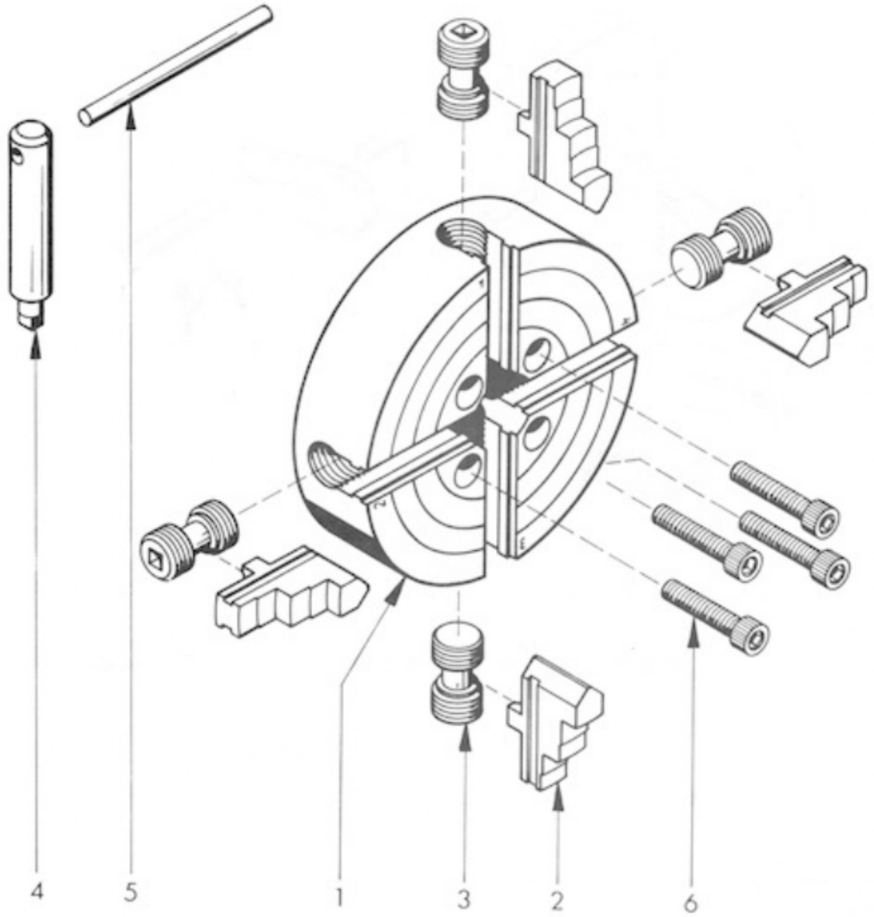


Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1-19	**200 500**			**Gruppe Obersupport metr**	**Compound slide metr.**	**Ens. Chariot supérieur metr.**
	200 550			**Gruppe Obersupport zöll.**	**Compound slide inch**	**Ens. Chariot supérieur en pouces**
1	A5A 050 010			Obersupport	Top slide	Support supérieur
2	A5A 050 020			Oberplatte	Bottom slide	Base du chariot
3	A5A 050 050			Einstelleiste	Gib	Lardon de réglage
4	A5A 050 030			Oberspindelträger	Lead screw mount	Palier de broche
5	A5A 050 040			Oberspindel	Lead screw	Broche
6	A5A 050 070			Spannklaue	Tool clamp	Bride de serrage de l'outil
7	A5A 050 080			Gradskala	Graduated scale	Echelle
8	A2A 020 050			Handrad metr.	Handwheel metr.	Volant metr.
	A5B 050 090	M8		Handrad zöllig	Handwheel inch	Volant en pouces
9	B2A 040 100	M8		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
10	B4A 050 120			Ballenscheibe	Washer	Rondelle spherique
11	ZSR 12 0412	M4x12DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
12	ZSR 12 0612	M6x12DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
13	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
14	ZMU 34 0300	M3 DIN 934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
15	ZST 53 0312	M3x12DIN553-5.8		Gewindestift	Set screw	Vis pointeau
16	ZMU 17 0500	M5 DIN917-5.8		Hutmutter	Cap nut	Ecrou borgne
17	ZFD 20 4152	DIN 152		Druckfeder	Compression spring	Ressort de compression
18	ZSR 38 0840	M8x40DIN938-5.6		Stiftschraube	Stud	Goujon
19	A5A 000 340			Drehstahlunterlage	Tool base	Base pour outil

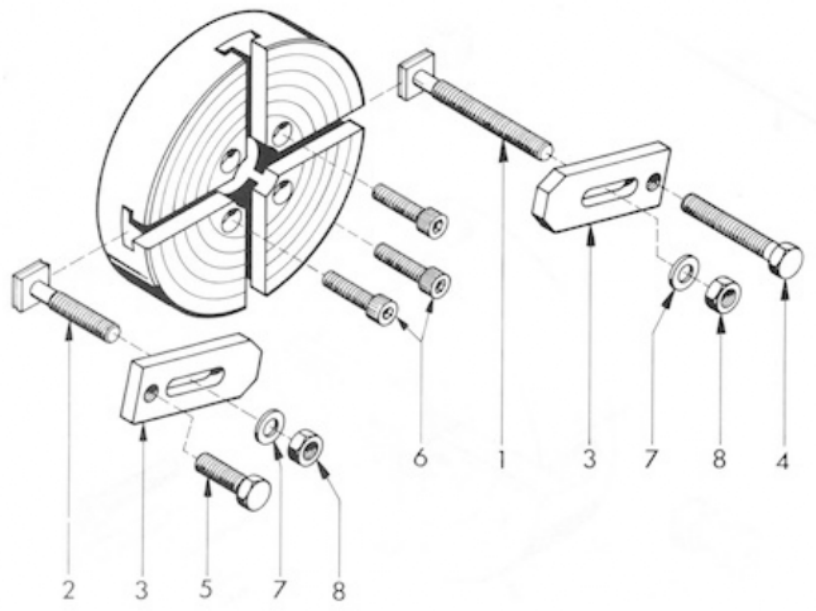




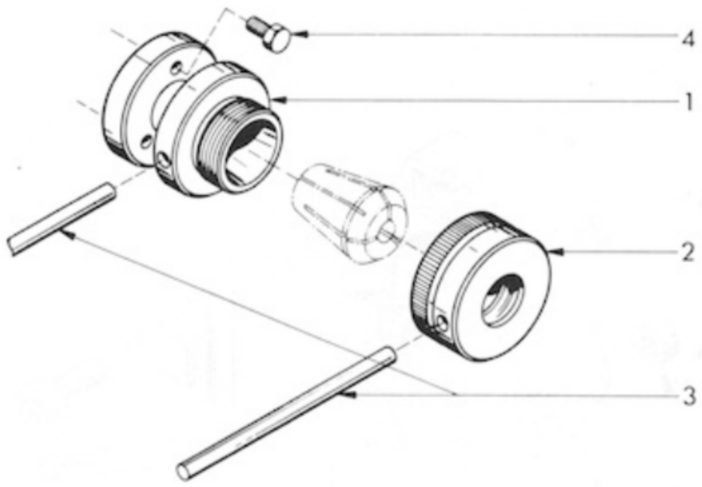
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 410			**3–Backen Drehfutter**	**3–Jaw-chuck**	**Mandrin à 3 mors**
1	A5Z 410 010			Gehäuse	Housing	Corps
2	A5Z 410 020			Zahnkranz	Scroll	Couronne
3	A5Z 410 030			Flansch	Flange	Flasque
4	A5Z 410 040			Satz von 3 Umkehrbacken	Set of 3 reversible jaws	Jeu de 3 mors reversibles
5	A5Z 410 050			Schlüssel	Key	Cle
6	A5Z 410 060			Knebel	Toggle	Garrot
7	ZSR 12 0530	M5x30 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZSR 12 0412	M4x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
9	ZSB 02 6006			Ausgleichscheibe	Compensating washer	Rondelle de compensation



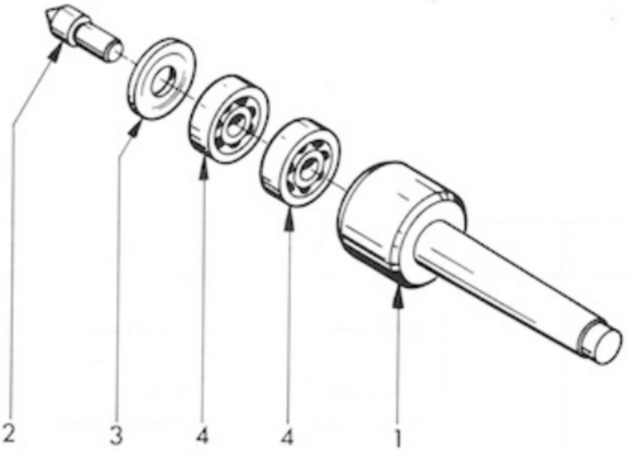
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 420			**Planscheibe**	**Independend chuck**	**Plateau americain**
1	A5Z 420 010			Gehäuse	Housing	Corps
2	A5Z 420 020			Satz von 4 Umkehrbacken	Set of 4 reversible jaws	Jeu de 4 mors reversible
3	A2Z 420 020			Spannschraube	Spindle	Broche
4	A2Z 420 040			Schlüssel	Key	Cle
5	ZST 75 0460	4x60DIN1475-6.8		Knebel	Toggle	Garrot
6	ZSR 12 0525	M5x25DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux



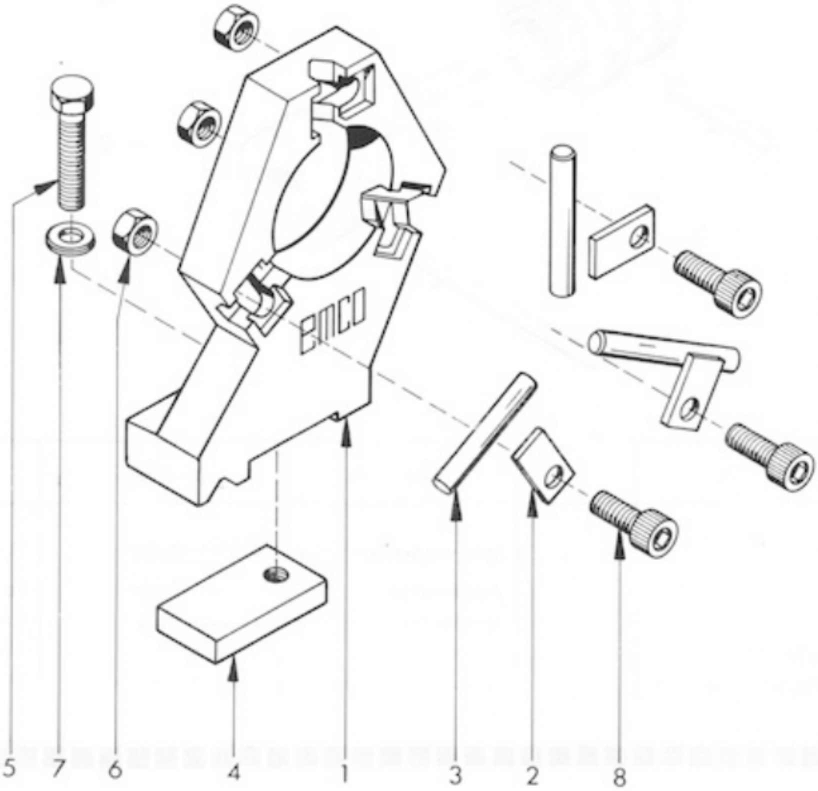
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 36o			Aufspannscheibe	Clamping plate	Plateau de serrage
1	A3Z 35o o2o			Spannschraube 55	Clamping screw 55	Vis de serrage 55
2	A3Z 35o o3o			Spannschraube 35	Clamping screw 35	Vis de serrage 35
3	A2Z 351 olo			Spanneisen	Clamping jaw	Bride de serrage
4	ZSR 33 o64o	M6x4o DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
5	ZSR 33 o62o	M6x2o DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
6	ZSR 12 o52o	M5x2o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZSB 25 o64o	B6,4 DIN 125		Scheibe	Washer	Rondelle
8	ZMU 34 o6oo	M6 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans



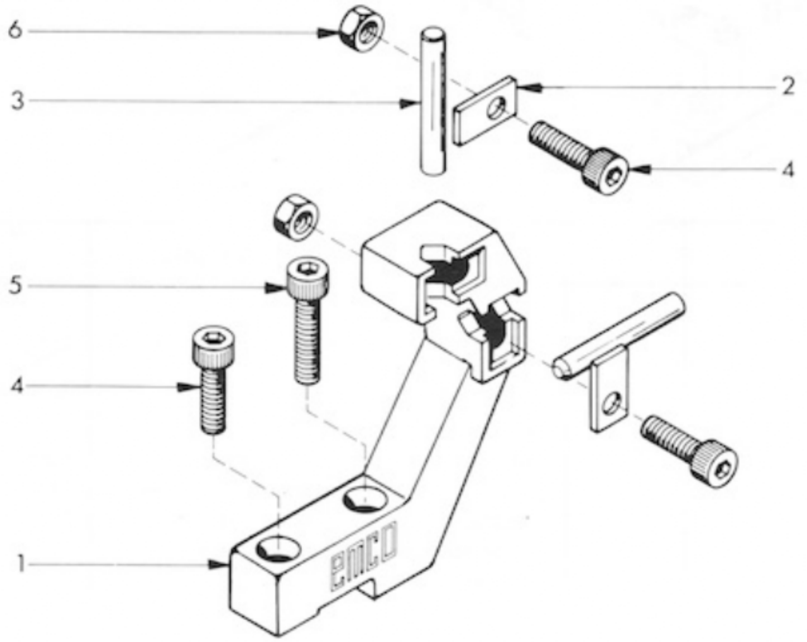
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo o4o			Spannzangenvorrichtung	Collet holder	Porte-pinces
1	A5Z o4o o1o			Zangenhalter	Collet holder	Porte-pinces
2	A5Z o4o o2o			Spannmutter	Locking ring	Ecrou de serrage
3	ZST 11 o71o	6x1oo DIN 7		Zylinderstift	Dowel pin	Tige de serrage
4	ZSR 33 o51o	M5x1o DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale



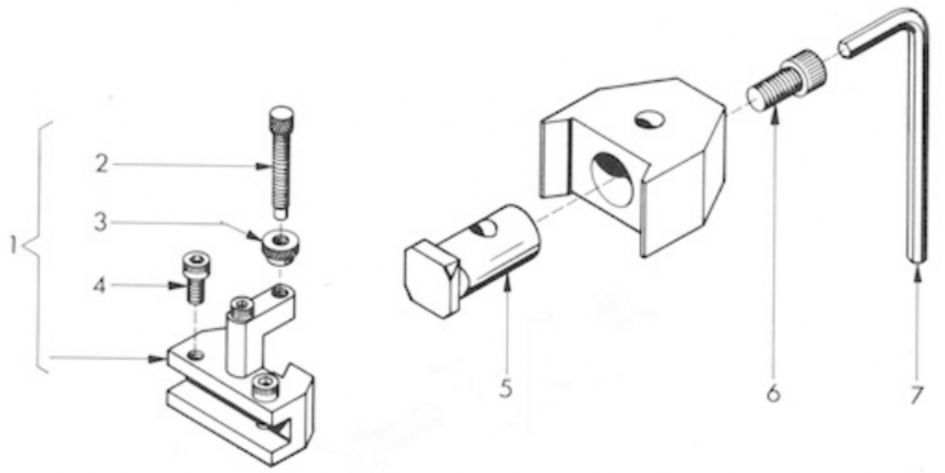
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 27o			Rollkörner	Revolving center	Pointe tournante
1	A5Z 27o o1o			Körper	Housing	Corps
2	A2Z 27o o2o			Spitze	Center	Pointe
3	A2Z 26o o3o			Deckel	Cover	Couvercle
4	ZLG o6 26oo			Rillenkugellager	Ball bearing	Roulement à billes



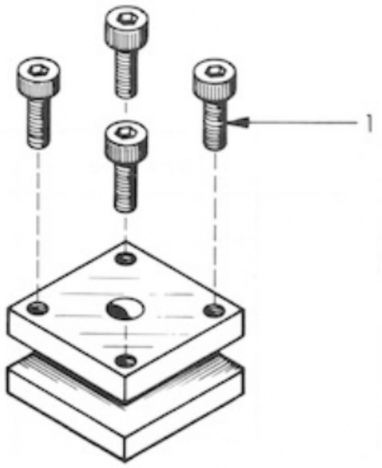
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 240			**Stehlünette**	**Fixed steady**	**Lunette fixe**
1	A5Z 240 010			Stehlünette	Body	Corps
2	A3Z 240 020			Klemmplatte	Clamping plate	Plaque de blocage
3	A3Z 240 030			Gleitstift	Slide- pin	Coulisseau
4	A3A 000 040			Klemmplatte	Clamping plate	Plaque de blocage
5	ZSR 33 0630	M6x30 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
6	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
7	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
8	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux



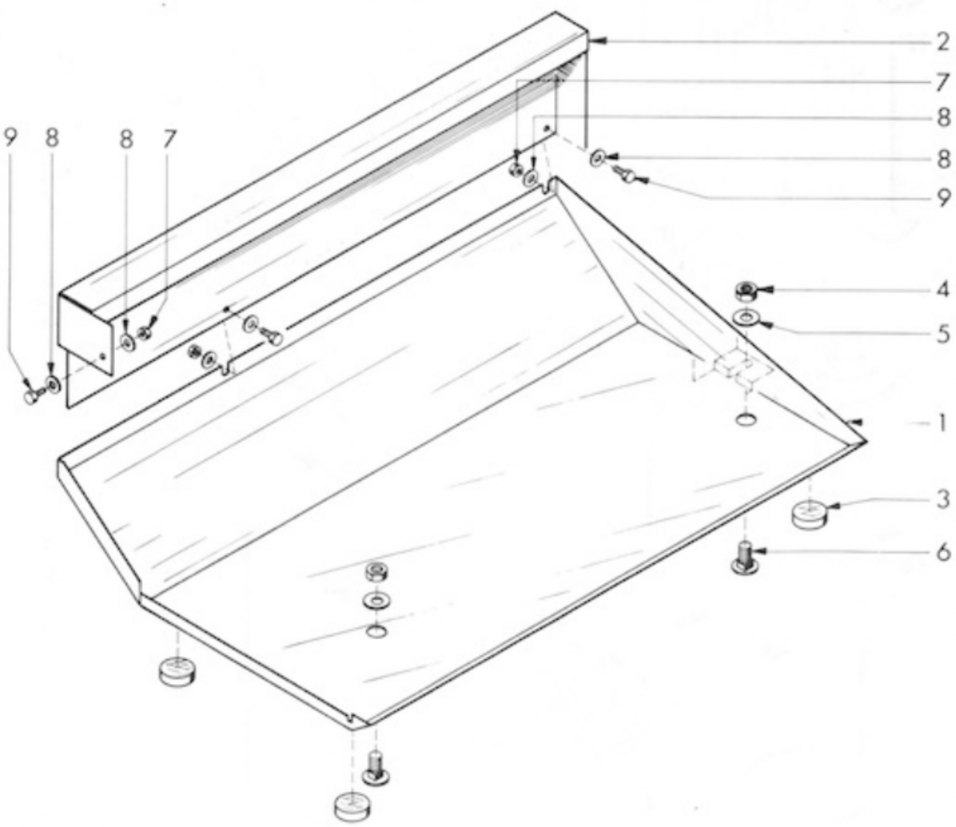
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 23o			Mitlauflünette	Travelling steady	Lunette à suivre
1	A5Z 23o o1o			Körper	Body	Corps de la lunette
2	A3Z 24o o2o			Klemmplatte	Clamping plate	Contre-plaque de blocage
3	A3Z 24o o3o			Gleitstift	Slide pin	Goupille reglable
4	ZSR 12 o62o	M6x2o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
5	ZSR 12 o625	M6x25 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
6	ZMU 34 o6oo	M6 DIN 934-6		Sechskantmutter	Hexagon nut	Excrou 6 pans



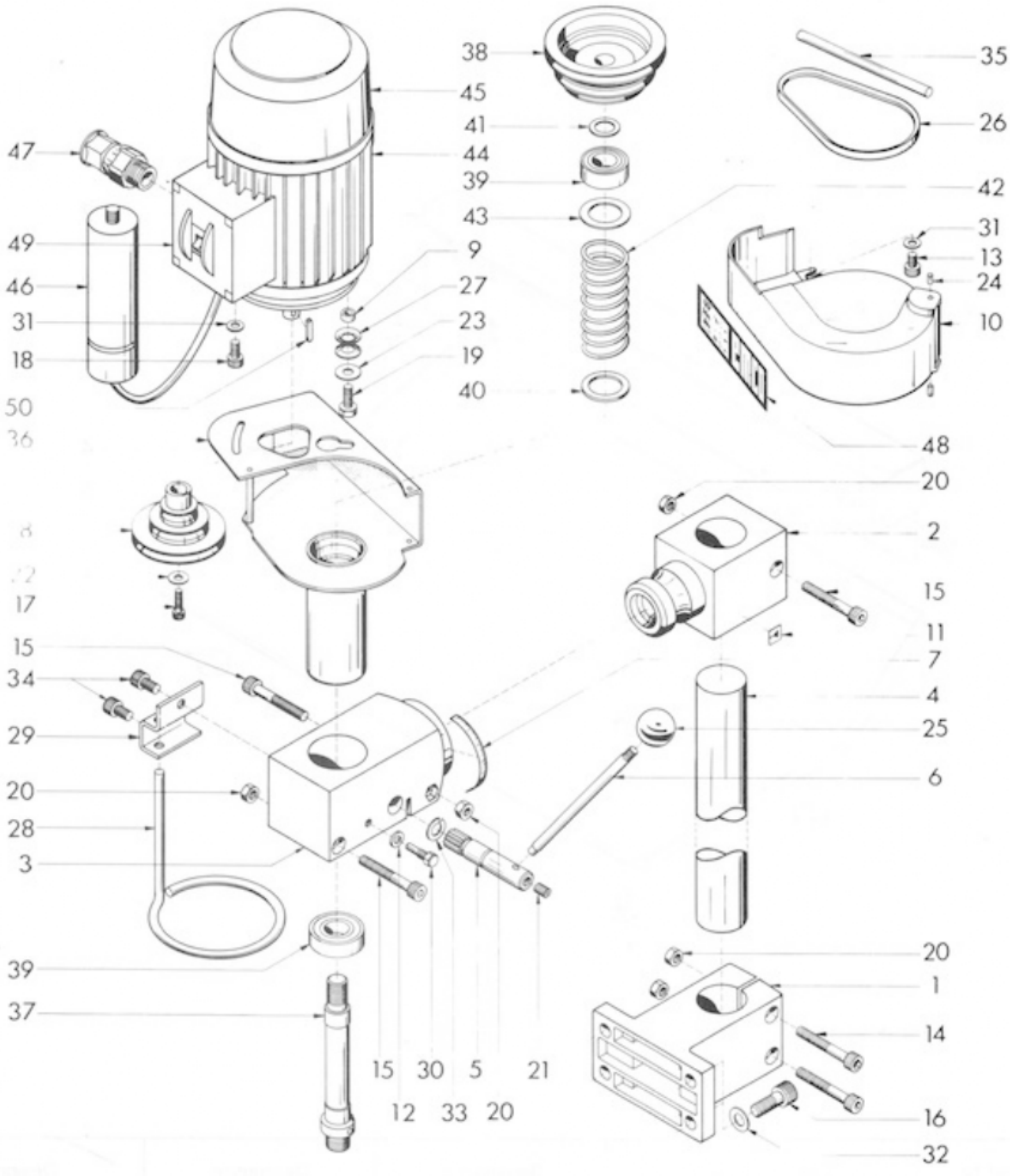
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2o2 ooo			Schnellwechselstahlhalter	Quick-change toolpost	Tourelle porte-outil à changement rapide
1	ZME o9 oo7o			Stahlhalter	Toolpost	Porte-outil
2	ZME o9 oo71			Rändelschraube	Knurled screw	Vis
3	ZME o9 oo72			Rändelmutter	Knurled nut	Ecrou
4	ZSR 12 o51o	M5 x 1o		Zylinderschraube	Socket head screw	Vis 6 pans creux
5	ZME o9 oo73			Klemmstück	Clamp pad	Pièce de serrage
6	ZSR 12 o816	M8 x 16		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZWZ 11 o6oo	SW 6		Schraubendreher	Hexagonal key	Clé à 6 pans



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo o1o			Zweifachstahlhalter	2-way toolpost	Tourelle
1	ZSR 12 o616	M6x16 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 15o			Gruppe Spritzwand	Splash guard	Pare gouttes
1	A5Z 15o o1o			Spänetasse	Chip tray	Bac ầ copeaux
2	A5Z 15o o2o			Spritzwand	Backplate	Panneau
3	ZGU o5 ooo1	28/8		Filzgleiter	Felt disc	Rondelle de feutre
4	ZMU 34 o8oo	M8 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans
5	ZSB 21 o84o	A84 DIN 9o21		Scheibe	Washer	Rondelle
6	ZSR o3 o82o	M8x2o DIN 6o3-4.6		Flachrundschraube	Square neck bolt	Collet carre
7	ZMU 34 o5oo	M5 DIN 934-5		Sechskantmutter	Hexagon nut	Ecrou 6 pans
8	ZSB 21 o53o	A5,3 DIN 9o21		Scheibe	Washer	Rondelle
9	ZSR 84 o512	M5x12 DIN 84-4.8		Zylinderschraube	Flat head screw	Vis ầ tête cylindrique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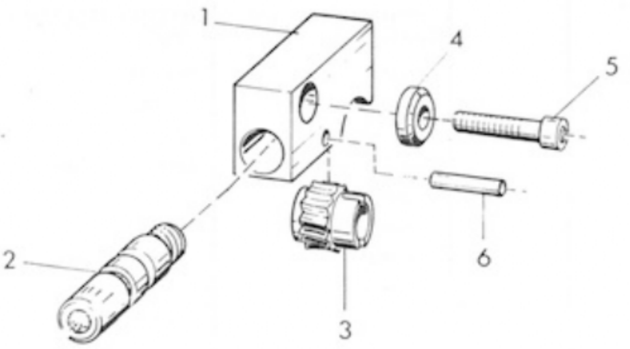
Spannung Voltage (V) Tension	Frequenz Frequency Frequence	Ref.Nr. für Gr. E-Ausrüstung Ref.No. for electr. equipment compl. Ref.Nr. pour ens. èlectrique èquipement	Ref.Nr. für Kondensator Ref.No. for condenser Ref.Nr. pour condesateur
115	6o	ZMO 76 1115	ZME 2o oo71
115	6o CSA	ZMO 77 1115	ZME 2o oo71
1oo	5o	ZMO 75 11oo	ZME 2o oo72
1oo	6o	ZMO 76 11oo	ZME 2o oo72
11o	5o	ZMO 75 111o	ZME 2o oo71
22o	6o	ZMO 76 122o	ZME 2o oo73
23o	5o	ZMO 75 123o	ZME 2o oo73
24o	5o	ZMO 75 124o	ZME 2o oo73
25o	5o	ZMO 75 125o	ZME 2o oo74
22o	5o VDE	ZMO 75 1221	ZME 2o oo73
22o	5o SEV	ZMO 75 1222	ZME 2o oo73

Pos.	Ref. No.	DIN		Benennung	Description	Designation
				Vertikale Fräs- und Bohrvorrichtung	Vertical attachment compl.	Ens. dispositif vertical
1	A5Z loo olo			Sockel	Pedestal	Socle support
2	A5Z loo o2o			Klemmkopf	Headstock adapter	Support vertical de poupée
3	A5Z loo o3o			Pinolenhalter	Quill holder	Porte fourreau
4	A5Z loo o4o			Vertikalsäule	Vertical column	Colonne verticale
5	A5Z loo o5o			Ritzel	Pinion	Pignon
6	A5Z loo o6o			Knebel	Toggle	Genouillére
7	A5Z loo o7o			Gradskala	Graduated scale	Echelle
8	A5Z loo o9o			Motorriemenscheibe	Motor pulley	Poulie de moteur
9	A5Z loo 12o			Distanzhülse	Spacer	Douille d'écartement
lo	A5Z loo 13o			Räderdeckel	Cover	Couvercle
11	H8A ooo 12o			Zeiger	Pointer	Aiguille
12	A5Z loo 15o			Distanzscheibe	Distance washer	Rondelle
13	ZSR 12 o5o8	M5x8 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
14	ZSR 12 o635	M6x35 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
15	ZSR 12 o64o	M6x4o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
16	ZSR 12 o82o	M8x2o DIN 912-8.8		Zylinderschraube	Socket head screw	Vis 6 pans creux
17	ZSR 12 o416	M4x16 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
18	ZSR 12 o512	M5x12 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
19	ZSR 33 o516	M5x16 DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
2o	ZMU 34 o6oo	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
21	ZST 13 o6o8	M6x8 DIN 913-45H		Gewindestift	Set screw	Vis pointeau
22	ZSB 21 o43o	A4, 3 DIN 9o21		Scheibe	Washer	Rondelle
23	ZSB 22 o53o	B 5,3 DIN 9o21		Scheibe	Washer	Rondelle
24	ZST 72 o3o6	3x6 DIN 1472-6.8		Paßkerbstift	Grooved adjusting pin	Chevelle de position
25	ZGF 19 25o6	C25xM6 DIN 319		Kugelknopf	Ball knob	Sphére
26	ZRM 4o 526o	TX 5x26o		Keilriemen	V-belt	Courroie-V
27	ZFD 93 15ol	15x8,2xo,7,DIN2o93		Tellerfeder	Disc spring	Ressort beleville
28	A3Y loo 11o			Schutzring	Protection ring	Anneau de protection
29	A3Y loo 12o			Führungslasche	Guide sheet	Tôle de guidage
3o	A5Z loo 14o			Schraube	Screw	Vis
31	ZSB 25 o53o	B5,3 DIN 125		Scheibe	Washer	Rondelle
32	ZSB 25 o84o	B8,4 DIN 125		Scheibe	Washer	Rondelle
33	ZRG 21 o12o	WR12		Sprengring	Retaining ring	Bague élastique
34	ZSR 12 o6lo	M6xlo DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
35	ZST 11 o7lo	6xloo DIN 7		Zylinderstift	Dowel pin	Tige de serrage
36-43	A5Z lol ooo			Gruppe Pinole	Quill compl.	Ens. Canon
36	ZME 4oo loo			Trägerplatte	Carrier plate	Support
37	A5Z lol o2o			Vertikalspindel	Vertical spindle	Broche verticale
38	A5Z lol o3o			Riemenscheibe	Pulley	Poulie
39	ZLG 6o o2o2	6oo2-2Z		Rillenkugellager	Ball bearing	Roulement á billes
4o	ZSB lo o282	SS2ox28x2		Stützscheibe	Supporting ring	Rondelle
41	ZSB lo 2181	SS12x18x1,2		Stützscheibe	Supporting ring	Rondelle
42	A5Z loo o8o			Druckfeder	Compression spring	Ressort de compression
43	ZSB 12 221o	PS22x32x1		Paßscheibe	Ring	Rondelle
44-49	ZMO .. ....*			E-Ausrüstung	Drive unit	Ens. Entrainement
44				Motor	Motor	Moteur
45	ZME 2o oo36			Lüfterhaube	Fan cover	Carter de ventilateur
46	ZME .. ....*			Kondensator	Condenser	Condensateur
47	ZPG lo ooo8	MZB 13		Kabelverschraubung	Screw type cond.fittg.	Raccordement á vis
48	A5A 2oo 15o			Drehzahlschild 5o Hz	Speed plate 5o Hz	Plaquette de vitesses 5oHz
	A5B 2oo 15o			Drehzahlschild 6o Hz	Speed plate 6o Hz	Plaquette de vitesses 5oHz
49	ZME 2o oo3o			Schalter mit Gehäuse	Switch	Interrupteur

* **Ref. Nr. siehe Tabelle**

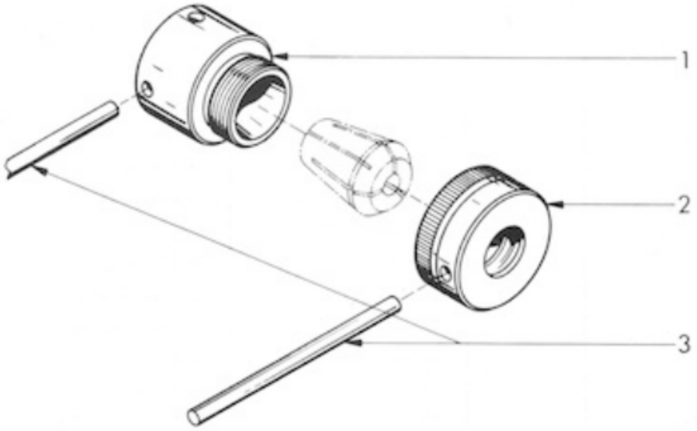
* **Ref. Nr. see table**

* **Ref. Nr. voir tableau**

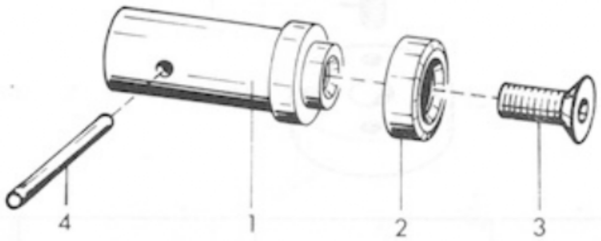


Pos.	Ref. No.	DIN		Benennung	Description	Designation
	151 11o			Gr. Vertikalfeinzustellung	Fine feed attachment	Ens. rêglage vertical fin
1	A3Y 11o o11			Lagerstock	Bearing block	Support de parlier
2	A3Y 11o o2o			Zustellschnecke	Worm	Commande de rêglage
3	A3Y 11o o3o			Zustellritzel	Splined shaft	Pignon de rêglage
4	A3Y 11o o4o			Scheibe	Washer	Rondelle
5	ZSR 12 o63o	M6x3o DIN 912-6.9		Zylinderschraube	Allen head screw	Vis 6 pans creux
6	ZST o6 o42o	4m6x2o DIN 7		Zylinderstift	Dowel pin	Vis tête cylindrique

* * *



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo o5o			Spannzangenvorrichtung	Collet holder	Porte-pinces
1	A5Z o5o o1o			Zangenhalter	Collet holder	Porte-pinces
2	A5Z o4o o2o			Spannmutter	Locking ring	Ecrou de serrage
3	ZST 11 o71o	6x1oo DIN 7		Zylinderstift	Dowel pin	Tige de serrage



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	151 o7o			Gr. Fräs- und Sägedorn	Sawing and milling arbor compl.	Ens. arbre p. fraise et p.-scie
1	A3Y o7o o1o			Fräs- und Sägedorn	Sawing and milling arbor	Arbre p-fraise et p-scie
2	A3Y o7o o2o			Gegenscheibe	Retaining ring	Contre-rondelle
3	ZSR 79 o82o	M8x2o DIN 7991-8.8		Senkschraube	Countersunk screw	Vis tête fraisée
4	A2Z 41o o5o			Zylinderstift	Dowel pin	Tige de serrage

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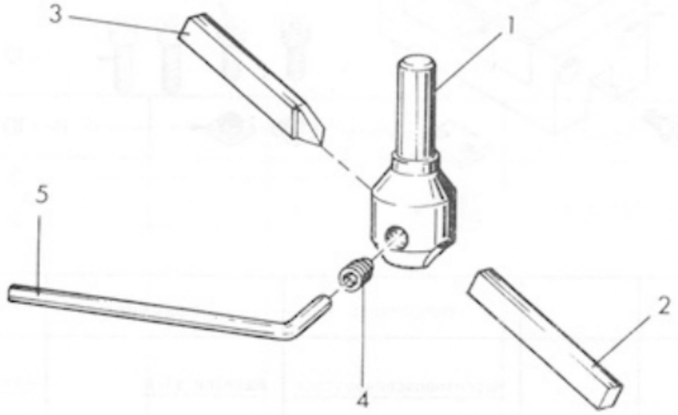
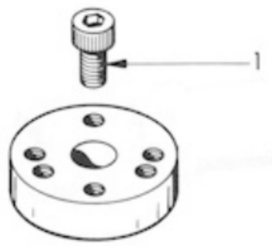
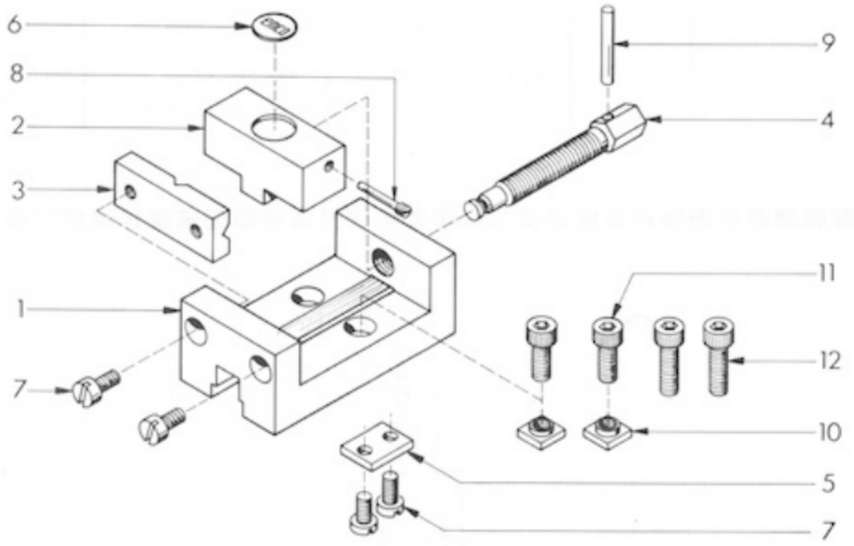


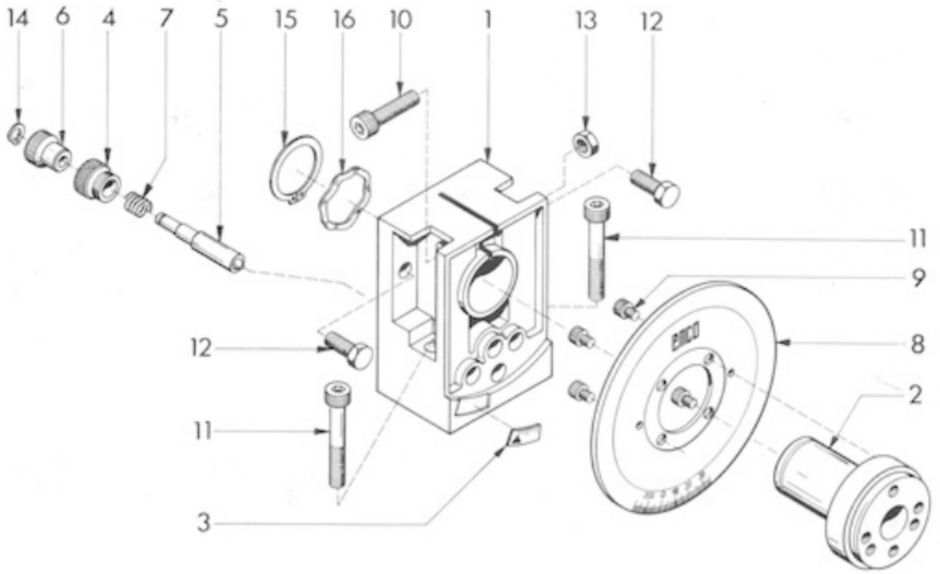
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	15o 1oo			Gruppe Ausdrehkopf	Fly cutter compl.	Ens. tête d'alèsage
1	A3Z 1oo o1o			Ausdrehkopf	Body	Corps
2	A3Z 1oo o2o			Drehstahl roh	Tool not ground	Barreau
3	A3Z 1oo o3o			Plandrehstahl	Planing tool	Outil á dresser
4	ZST 13 o6o8	M6x8 DIN 913-45H		Gewindestift	Set screw	Vis pointeau
5	ZWZ 11 o3oo	SW3 DIN 911		6kt. Schraubendreher	Hexagonal key	Clé á 6 pans



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 25o			Supportflansch	Cross slide adaptor	Flasque de montage
1	ZSR 12 o612	M6x12 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 31o			Maschinenschraubstock	Machine vice	Etau-machine
1	A5Z 31o o1o			Körper	Body	Corps
2	A5Z 31o o2o			Backe	Moving jaw	Mors mobile
3	A5Z 31o o3o			Backe	Fixed jaw	Mors fixe
4	A5Z 31o o4o			Spindel	Operating screw	Broche
5	A5Z 31o o5o			Untergriffleiste	Plate	Plaquette
6	A2Z 43o o4o			Firmenschild	Name plate	Ecusson
7	ZSR 84 o51o	M5x1o DIN 84-4.8		Zylinderschraube	Flat head screw	Vis á tête cylindrique
8	VOA ooo o6o	3x12 DIN 1481		Sicherungsschraube	Lock screw	Vis de blocage
9	ZST 75 o43o	4x3o DIN 1475-6.8		Knebelkerbstift	Pin	Goupille
1o	A3A o7o o2o			Nutenstein	T-nut	Ecrou en T
11	ZSR 12 o616	M6x16 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
12	ZSR 12 o62o	M6x2o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux

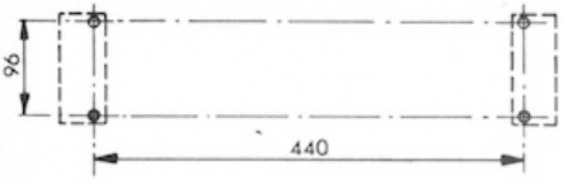


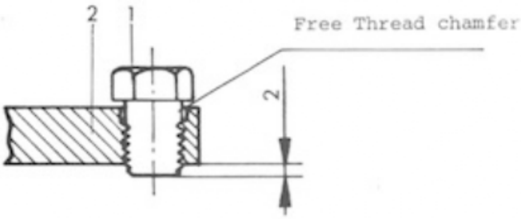
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	2oo 32o			Teilapparat	Dividing attachment	Appareil diviseur
1	A5Z 32o o1o			Gehäuse	Housing	Corps
2	A5Z 32o o2o			Aufnahmeflansch	Flange	Faux plateau
3	A5Z 32o o3o			Nonius	Vernier	Vernier
4	A5Z 32o o4o			Rändelmutter	Knurled nut	Ecrou moletêe
5	A5Z 32o o5o			Indexbolzen	Indexing pin	Boulon index
6	A3Z 32o o6o			Rändelhülse	Knurled sleeve	Boulon moletêe
7	A3Z 32o o7o			Druckfeder	Compression spring	Ressort de compression
8	A5Z 321 ooo			Teilscheibe	Index plate	Disque diviseur
9	ZSR 12 o4o6	M4x6 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
1o	ZSR 12 o625	M6x25 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
11	ZSR 12 o64o	M6x4o DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
12	ZSR 33 o616	M6x16 DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
13	ZMU 34 o6oo	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Écrou 6 pans
14	ZRG 71 o5o6	5xo,6 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
15	ZRG 71 2412	24x1,2 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
16	ZSB o4 6oo3	16oo2/K3		Ausgleichscheibe	Compensating washer	Rondelle de compensation

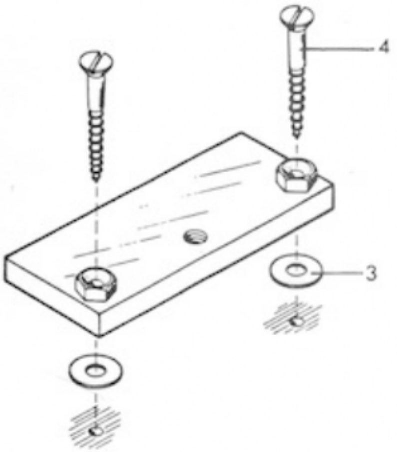
Leveling Device for COMPACT 5

(Ref. No. 200 210)

If you demand highest precision work from a lathe, the machine has to be put on a leveling plate and aligned by means of a leveling device. Without such an alignment it may occur that you do not succeed in turning cylindrically.







Use of leveling device:

This device serves for alignment of the COMPACT 5.

1. Drill 4 holes dia. 4 x 35 mm into the ground plate (see drill template). A stable, torsion-free wood or wood-fibre board approx. 5o mm thick can be used as ground plate. If you use an old chip pan, then rough-drill it accordingly.
2. Screw leveling bolt (1) into leveling plate (2). The bolts should stand out some 2 mm. Use leveling plate (2) such that free thread chamfer is like on drawing.
3. Place washers (3) underneath and tighten leveling plate with screws (4) onto ground plate. Put a drop of oil between screws (4) and leveling bolt.
4. Put down COMPACT 5 and screw tightly.

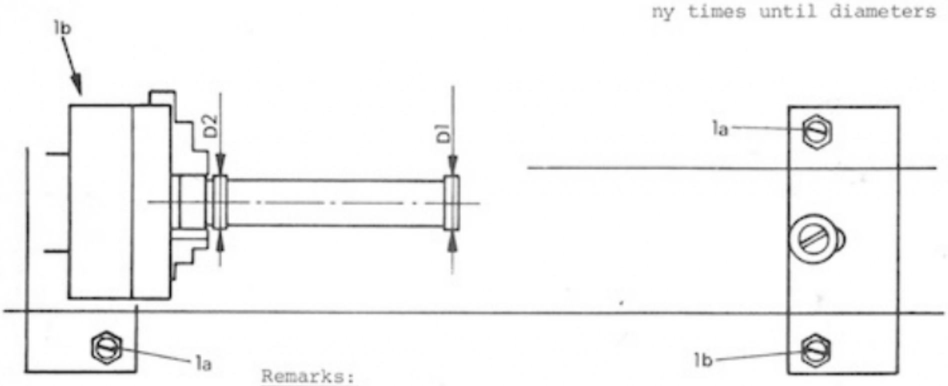
5. Alignment:

5.1. Mount ready-turned workpiece (comes with leveling device) in 3-jaw chuck and tighten slightly, support workpiece using tailstock, tighten firmly, move tailstock away and turn without tailstock support.

5.2. Use right hand side tool and turn off at both diameters D1, D2. Depth of cut o,1 mm.

5.3. Measure diameters by one-hundredth of mm. If D2 is bigger than D1, screw in leveling bolts 1a or screw out leveling bolts 1b. - Thereby, screw (4) must not be turned round. If D1 is bigger than D2, your proceed vice-versa.

5.2. and 5.3. have to be repeated so many times until diameters are identical.



Remarks:

Without the leveling device the machine can be aliqued by placing metal sheets under the lathe bed.

Inch version of Compact 5 (60 cycles)

In the instruction manual the metric version is described. The inch version has the following basic differences:

Pitch of leadscrew, cross slide spindle have inch pitches. This causes another gear combination for feeds and thread pitches as well as different readings on the dials. In the spare parts list you find the metric and inch numbers for parts which differ.

Differences concerning the inch version

Page 4

Technical Data:

Pitch of leadscrew: 16 tpi
Pitch of cross slide spindle: 2o tpi

Range of speeds: 5o cycles 2oo-24oo rpm
6o cycles 25o-28oo rpm

Feeds: o,oo3" per revolution
o,oo4" per revolution

Thread pitches with accessory automatic feed mechanism (on inch type machine)

16,2o,24,32 tpi

Thread pitches with change gear set (on inch type machine)

Inch threads: 1o,12,13,14,15,18,
26,28,36,4o,48,56 64

Metric threads: o,25/o,3/o,45/o,5/o,6/
o,75/o,8/1,o/1,25/1,5/ 1,75 mm

Page 8

The chart shows speeds for 5o cycles o,oo3" and o,oo6" equals approx. o,o7 mm and o,14 mm so that you can read out recommended speeds.

Page 13

Illustrations and examples show 5o cycles machine.
The corresponding speed of BC3 (55o rpm) is 65o rpm on a 6o cycle machine.

Page 14/15/16

Handwheel for longitudinal slide

As the spindle has a pitch of 16 tpi, the longitudinal slide moves o,o625" when you make a full revolution of the handwheel. Turning the handwheel one graduation, the slide moves o,oo125".

Handwheel on cross slide

The cross slide spindle has a pitch of 2o tpi.
Turning the handwheel a full revolution, the slide moves o,o5".
The scale and its divisions relate to the diameter. It shows o,1" with a full revolution. So if you turn the handwheel one revolution, the diameter is reduced o,1".
Turning the handwheel one graduation, the diameter will be reduced o,o2".

Top slide:

With one revolution the slide moves o,o4".
One graduation is o,oo2".

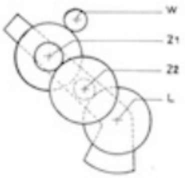
Page 29/30

The feed sizes on the inch machine differ (see plate on your machine), but the gear combinations are the same for this example.

“/↻	0,003	0,006
W	20	20
Z1	25 60	50 60
Z2	60 20	60 20
L	H 60	H 60

Page 30

Thread sizes and gear combinations shown on the chart (inch version)



n/1“	10	12	14	16	18	20	24	28	32	40	48
W	20	20	20	20	20	20	20	20	20	20	20
Z1	H 72	H 72	H 72	H 60	H 72	H 60	H 60	H 72	H 60	H 40	H 60
Z2	40 20	60 25	40 20	60 20	40 25	60 25	50 25	60 35	25 20	60 50	20 25
L	25 H	36 H	35 H	60 H	36 H	60 H	60 H	60 H	50 H	60 H	H 60

mm	0,25	0,3	0,45	0,5	0,6	0,75	0,8	1,0	1,25	1,5	1,75
W	20	20	20	20	20	20	20	20	20	20	20
Z1	H 60	H 60	H 72	H 72	H 72	H 72	H 72	H 72	H 72	H 72	H 72
Z2	34 60	34 50	34 40	34 36	34 36	34 36	30 34	34 30	40 30	34 20	50 35
L	72 H	72 H	60 H	60 H	50 H	40 H	35 H	36 H	34 H	36 H	26 H

Additional thread pitches not shown on the chart

n/1"	8	13	15	26	36	56	64
W	2o	2o	2o	2o	2o	2o	2o
Z1	H 6o	H 72	H 72	H 72	H 72	H 72	H 72
Z2	5o 2o	4o 25	4o 25	2o 25	4o 36	2o 35	25 4o
L	25 H	26 H	3o H	26 H	5o H	4o H	5o H

Page 38

Speeds for 6o cycle machine: 45o,8oo, 19oo rpm.

Page 41/45

Concerning speed chart:
Take instead of 16oo - 19oo
7oo - 8oo
38o - 45o
if you have a 6o cycle machine.